

Service Manual

LG-S367

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1. INTRODUCTION

1.1 Purpose

This manual provides the information necessary to repair, calibration, description and download the features of this model.

1.2 Regulatory Information

A. Security

Toll fraud, the unauthorized use of telecommunications system by an unauthorized part (for example, persons other than your company's employees, agents, subcontractors, or person working on your company's behalf) can result in substantial additional charges for your telecommunications services. System users are responsible for the security of own system. There are may be risks of toll fraud associated with your telecommunications system. System users are responsible for programming and configuring the equipment to prevent unauthorized use. The manufacturer does not warrant that this product is immune from the above case but will prevent unauthorized use of common-carrier telecommunication service of facilities accessed through or connected to it.

The manufacturer will not be responsible for any charges that result from such unauthorized use.

B. Incidence of Harm

If a telephone company determines that the equipment provided to customer is faulty and possibly causing harm or interruption in service to the telephone network, it should disconnect telephone service until repair can be done. A telephone company may temporarily disconnect service as long as repair is not done.

C. Changes in Service

A local telephone company may make changes in its communications facilities or procedure. If these changes could reasonably be expected to affect the use of the this phone or compatibility with the network, the telephone company is required to give advanced written notice to the user, allowing the user to take appropriate steps to maintain telephone service.

D. Maintenance Limitations

Maintenance limitations on this model must be performed only by the manufacturer or its authorized agent. The user may not make any changes and/or repairs expect as specifically noted in this manual. Therefore, note that unauthorized alternations or repair may affect the regulatory status of the system and may void any remaining warranty.

E. Notice of Radiated Emissions

This model complies with rules regarding radiation and radio frequency emission as defined by local regulatory agencies. In accordance with these agencies, you may be required to provide information such as the following to the end user.

F. Pictures

The pictures in this manual are for illustrative purposes only; your actual hardware may look slightly different.

G. Interference and Attenuation

Phone may interfere with sensitive laboratory equipment, medical equipment, etc. Interference from unsuppressed engines or electric motors may cause problems.

H. Electrostatic Sensitive Devices

ATTENTION

Boards, which contain Electrostatic Sensitive Device (ESD), are indicated by the sign. Following information is ESD handling:



- Service personnel should ground themselves by using a wrist strap when exchange system boards.
- When repairs are made to a system board, they should spread the floor with anti-static mat which is also grounded.
- Use a suitable, grounded soldering iron.
- Keep sensitive parts in these protective packages until these are used.
- When returning system boards or parts like EEPROM to the factory, use the protective package as described.

1.3 Abbreviations

For the purposes of this manual, following abbreviations apply:

APC	Automatic Power Control
BB	Baseband
BER	Bit Error Ratio
CC-CV	Constant Current – Constant Voltage
DAC	Digital to Analog Converter
DCS	Digital Communication System
dBm	dB relative to 1 milli watt
DSP	Digital Signal Processing
EEPROM	Electrical Erasable Programmable Read-Only Memory
ESD	Electrostatic Discharge
FPCB	Flexible Printed Circuit Board
GMSK	Gaussian Minimum Shift Keying
GPB	General Purpose Interface Bus
GSM	Global System for Mobile Communications
IPUI	International Portable User Identity
IF	Intermediate Frequency
LCD	Liquid Crystal Display
LDO	Low Drop Output
LED	Light Emitting Diode
OPLL	Offset Phase Locked Loop

1. INTRODUCTION

PAM	Power Amplifier Module
PCB	Printed Circuit Board
PGA	Programmable Gain Amplifier
PLL	Phase Locked Loop
PSTN	Public Switched Telephone Network
RF	Radio Frequency
RLR	Receiving Loudness Rating
RMS	Root Mean Square
RTC	Real Time Clock
SAW	Surface Acoustic Wave
SIM	Subscriber Identity Module
SLR	Sending Loudness Rating
SRAM	Static Random Access Memory
PSRAM	Pseudo SRAM
STMR	Side Tone Masking Rating
TA	Travel Adapter
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
UART	Universal Asynchronous Receiver/Transmitter
VCO	Voltage Controlled Oscillator
VCTCXO	Voltage Control Temperature Compensated Crystal Oscillator
WAP	Wireless Application Protocol

2. PERFORMANCE

2.1 H/W Features

Item	Feature	Comment
Standard Battery	Lithium-Ion, 3.7V 900mAh	
Stand by TIME	Up to 400hrs : Paging Period 5, RSSI -85dBm	
Talk time	Up to 240min : GSM Tx Level 5	
Charging time	Approx. 3 hours	
RX Sensitivity	GSM, EGSM: -109dBm, DCS: -109dBm	
TX output power	GSM, EGSM: 32.3dBm(Level 5), DCS , PCS: 29.5dBm(Level 0)	
GPRS compatibility	Class 12	
SIM card type	3V / 1.8V	
Display	MAIN : 2.4" TFT 320 × 240 pixel 65K Color	
Status Indicator	Hard icons. Key Pad 0 ~ 9, #, *, Up/Down Left/Right OK Key Send Key, PWR Key ,Soft Key(Left/Right),	
ANT	Internal	
EAR Phone Jack	Yes	
PC Synchronization	Yes	
Speech coding	EFR/FR/HR/AMR	
Data and Fax	Yes	
Vibrator	Yes	
Loud Speaker	Yes	
Voice Recoding	Yes	
Microphone	Yes	

2. PERFORMANCE

Item	Feature	Comment
Speaker/Receiver	16 Φ Speaker/ 12*7 Receiver	
Travel Adapter	Yes	
MIDI	64 Poly (Mono SPK)	
Camera	2M FF	
Bluetooth / FM Radio	Bluetooth version 2.1 / 76~108MHz supported	

2.2 Technical Specification

Item	Description	Specification					
1	Frequency Band	GSM850 TX: 824 ~ 849 MHz RX: 869 ~ 894 MHz DCS TX: 1710 ~ 1785 MHz RX: 1805 ~ 1880 MHz PCS TX: 1850 ~ 1910 MHz RX: 1930 ~ 1990 MHz EGSM TX: 880 ~ 915MHz RX: 925 ~ 960 MHz					
2	Phase Error	RMS < 5 degrees Peak < 20 degrees					
3	Frequency Error	< 0.1 ppm					
4	Power Level	GSM850/EGSM					
		Level	Power	Toler.	Level	Power	Toler.
		5	33dBm	±2dB	13	17dBm	± 3dB
		6	31dBm	±3dB	14	15dBm	± 3dB
		7	29dBm	±3dB	15	13dBm	± 3dB
		8	27dBm	±3dB	16	11dBm	± 5dB
		9	25dBm	±3dB	17	9dBm	± 5dB
		10	23dBm	±3dB	18	7dBm	± 5dB
		11	21dBm	±3dB	19	5dBm	± 5dB
		12	19dBm	±3dB			
		DCS/PCS					
		Level	Power	Toler.	Level	Power	Toler.
		0	30dBm	±2dB	8	14dBm	± 3dB
		1	28dBm	±3dB	9	12dBm	± 4dB
		2	26dBm	±3dB	10	10dBm	± 4dB
		3	24dBm	±3dB	11	8dBm	± 4dB
		4	22dBm	±3dB	12	6dBm	± 4dB
		5	20dBm	±3dB	13	4dBm	± 4dB
		6	18dBm	±3dB	14	2dBm	± 5dB
		7	16dBm	±3dB	15	0dBm	± 5dB

2. PERFORMANCE

Item	Description	Specification	
5	Output RF Spectrum (due to modulation)	GSM850/ EGSM	
		Offset from Carrier (kHz).	Max. dBc
		100	+0.5
		200	-30
		250	-33
		400	-60
		600~ <1,200	-60
		1,200~ <1,800	-60
		1,800~ <3,000	-63
		3,000~ <6,000	-65
		6,000	-71
		DCS/PCS	
		Offset from Carrier (kHz).	Max. dBc
		100	+0.5
		200	-30
		250	-33
		400	-60
		600~ <1,200	-60
		1,200~ <1,800	-60
		1,800~ <3,000	-65
		3,000~ <6,000	-65
		6,000	-73
6	Output RF Spectrum (due to switching transient)	GSM850/ EGSM	
		Offset from Carrier (kHz).	Max. dBm
		400	-19
		600	-21
		1,200	-21
		1,800	-24

2. PERFORMANCE

Item	Description	Specification		
6	Output RF Spectrum (due to switching transient)	DCS/PCS		
		Offset from Carrier (kHz).		Max. dBm
		400		-22
		600		-24
		1,200		-24
		1,800		-27
7	Spurious Emissions	Conduction, Emission Status		
8	Bit Error Ratio	GSM850, EGSM BER (Class II) < 2.439% @-102 dBm DCS,PCS BER (Class II) < 2.439% @-100 dBm		
9	RX Level Report Accuracy	±3 dB		
10	SLR	8±3 dB		
11	Sending Response	Frequency (Hz)	Max.(dB)	Min.(dB)
		100	-12	-
		200	0	-
		300	0	-12
		1,000	0	-6
		2,000	4	-6
		3,000	4	-6
		3,400	4	-9
		4,000	0	-
12	RLR	2±3 dB		

2. PERFORMANCE

Item	Description	Specification		
13	Receiving Response	Frequency (Hz)	Max.(dB)	Min.(dB)
		100	-12	-
		200	0	-
		300	2	-7
		500	*	-5
		1,000	0	-5
		3,000	2	-5
		3,400	2	-10
		4,000	2	
		* Mean that Adopt a straight line in between 300 Hz and 1,000 Hz to be Max. level in the range.		
14	STMR	> 17 dB		
15	Stability Margin	> 6 dB		
16	Distortion	dB to ARL (dB)	Level Ratio (dB)	
		-35	17.5	
		-30	22.5	
		-20	30.7	
		-10	33.3	
		0	33.7	
		7	31.7	
		10	25.5	
17	Side Tone Distortion	Three stage distortion < 10%		
18	System frequency (13 MHz) tolerance	≤ 2.5 ppm		
19	32.768KHz tolerance	≤ 30 ppm		
20	Ringer Volume	At least 55 dBspl under below conditions: 1. Ringer set as ringer. 2. Test distance set as 1 m		

2. PERFORMANCE

Item	Description	Specification	
21	Charge Current	Fast Charge : Typ. 600 mA Total Charging Time : average 3 hours	
22	Antenna Display	Bar Number	Power
		7	-92 <
		7 -> 5	-93 \pm 2
		5 -> 4	-98 \pm 2
		4 -> 2	-101 \pm 2
		2 -> 1	-104 \pm 2
		1 -> 0	-106 \pm 2
		0 -> OFF	-106 >
23	Battery Indicator (SPG:Software Power Gauge)	Battery Bar display	percentage
		10 Level (Full)	91~100%
		9 Level	81~90%
		8 Level	71~80%
		7 Level	61~70%
		6 Level	51~60%
		5 Level (Half)	41~50%
		4 Level	31~40%
		3 Level	21~30%
		2 Level	11~20%
		1 Level	3~10%
24	Low Voltage Warning (Blinking Bar)	$\leq 3.42 \pm 0.05V$ (Call), 1 time per 1 minute (Receiver)	
		$\leq 3.42 \pm 0.05V$ (Standby), 1 time per 3minutes(Speaker)	
25	Forced shut down Voltage	$3.35 \pm 0.05V$	
26	Sustain RTC without battery	220 min	
27	Battery Type	Lithium-Ion Battery Standard Voltage = 3.7 V Battery full charge voltage = 4.2 V Capacity: 900mAh	
28	Travel Charger	Switching-mode charger Input: 150 ~ 240V, 50/60 Hz Output: 5.1V, 700mA	

3. TECHNICAL BRIEF

3.1 Digital Main Processor

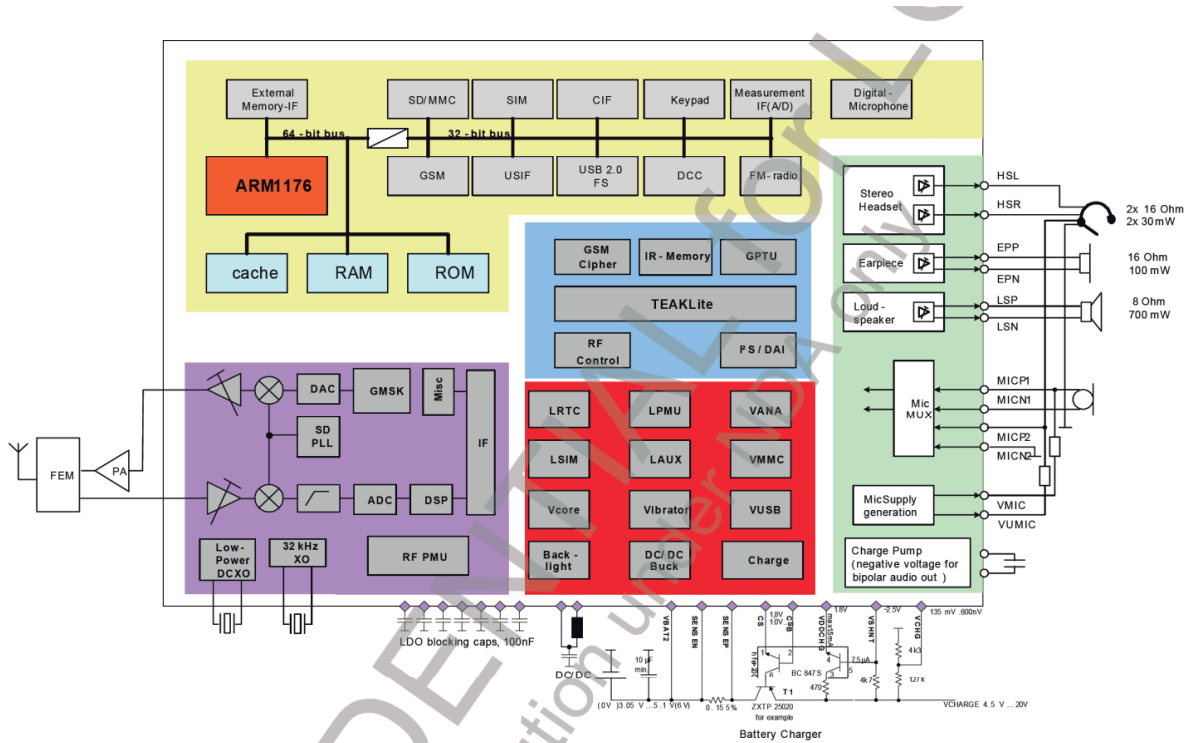


Figure. 3.1.1 X-Gold tm 215 Hardware Block Diagram

3.1.1 General

- Technology:
 - SoC, Monolithic, 65 nm CMOS
- Package:
 - eWLB, 8x9x0.8 mm
 - 0.5 mm pitch
 - 240 balls / 6-layer PCB

3.1.2 RF Transceiver

- Dual-band direct conversion receiver
- Tri/Quad-band possible with external circuitry
- Fully integrated digital controlled X0
- Additional buffer for 2 external system clocks
- Fully digital RF-Synthesizer incl. $\Sigma\Delta$ -Transmitter

3.1.3 Baseband

- DSP:
 - 178 MHz TeakLite™
- MCU:
 - ARM1176® @ 208 MHz
- MCU RAM:
 - 3.00Mbit
- Memory I/F:
 - 4 Gbit Nand flash/DDR SDRAM
- Modem:
 - GPRS class 12, (RX/TX CS1-CS4)
 - EGPRS class 12, (RX MCS1-MCS9, TX MCS1-MCS4)
- Cipher Units:
 - A51/2/3
 - GEA-1/2/3
- Security:
 - OMTP TR0
 - Secure Boot
 - RSA(ROM)/SHA-1(HW accel.)
 - OCDS disabling
 - Certificate Management

- Speech Codec:
 - FR / HR / EFR / NB-AMR
- Audio Codec (running on ARM1176):
 - SP-MIDI
 - SB-ADPCM
 - MP3
 - WB-AMR
 - AAC/AAC+/eAAC+
- Others:
 - DARP (SAIC)
 - TTY
- Customization:
 - E-Fuses

3.1.4 External Memory

- External Bus Unit
 - 16-bit address bus
 - 16-bit data bus
 - 1.8V support
- Flash / RAM
 - NAND Type(1 bit ECC supported)
 - Parallel Flash (Page & Burst Mode)
 - 16-bit AD-multiplexed
 - 16-bit AAD-multiplexed
 - iNAND Type e.g. oneNAND
- Memory card
 - SD/MMC card interface with 1 or 4 data lines

3.1.5 Connectivity

- Up to 3xUSIF (configurable either as SPI or UART), I2C, I2S; Interfaces @ 1.8V
- Direct (U)SIM 1.8/3V
- USB2.0 up to 480 Mbit/s (High Speed) w/ external USB Phy over ULPI interface
- Stereo Headset (Amplifier integrated)
- 3 external analog measurement PIN's
- Bluetooth

3.1.6 Mixed Signal

- Improved audio performance
- Loudspeaker Audio Class D Amplifier, 700 mW@8 Ω mono for hands-free and ringing
- Stereo Headset 2x30 mW@16 Ω w/o coupling C
- Mono Earpiece 100 mW@16 Ω
- Digital microphone supported
- Differential microphone inputs

3.1.7 FM Radio

- Integrated FM radio
 - FM Stereo RDS Receiver
 - Sensitivity 2 μ V EMF
 - Support for US & EU bands
 - Stereo recording

3.1.8 Power Management

- Direct-to-Battery Connection
 - LDOs (incl. capless)
 - DC/DC step-down converter
 - DC/DC step-up for white LED supply
- Battery Type
 - Li-Ion
- Charging control
 - Battery temperature
 - Watchdog protection
 - Start-up on flat battery
- External Charger
 - Switch mode
- USB battery charging
 - USB charging spec 1.0 compliant
- Backlight
 - Up to 4 serial white LEDs (integrated LDO)

3.1.9 LCD Display

- Type
 - QVGA, 65k color (parallel)
- Interface
 - Parallel 8bit
 - Interf. voltage at 1.8V or 2.8V
- gRacr - Display Controller (Hardware)
 - 30 fps Display update without DMA (up to 60 fps) (full or partial)
 - Video post processing Scaling, Rotation (90° steps), Mirroring
 - Overlay with alpha blending
 - Color conversion YUV -> RGB
 - 2D vector graphics (Lines, filled rectangles, Bit block transfer (e.g. sprites, scrolling, antialiased bitmap fonts))

3.1.10 Camera

- 2 M pixel, YUV parallel interface
- 15fps@ e Mpx full resolution.
- 39 MHz Pixel Rate
- HW JPEG encoder (39 Mpx/sec)

3.1.11 Video Capabilities

- Video Decoding MPEG-4/H.263
 - QCIF@30 fps
 - QVGA@15fps
- Video Encoding MPEG-4/H.263
 - QCIF@15 fps

3.1.12 Audio Capabilities

- Polyphonic ring tones
 - 64 voices MIDI, SP-MIDI
 - FM synthesizer
- AMR-WB
- True ring tones (MP3)
- MP3, eAAC+
- G.722 SB-ADPCM encoding/decoding

3.2 Power Management

A mobile platform requires power supplies for different functions. These power supplies are generated in the integrated power management Unit (PMU). The PMU is designed to deliver the power for a typical standard phone.

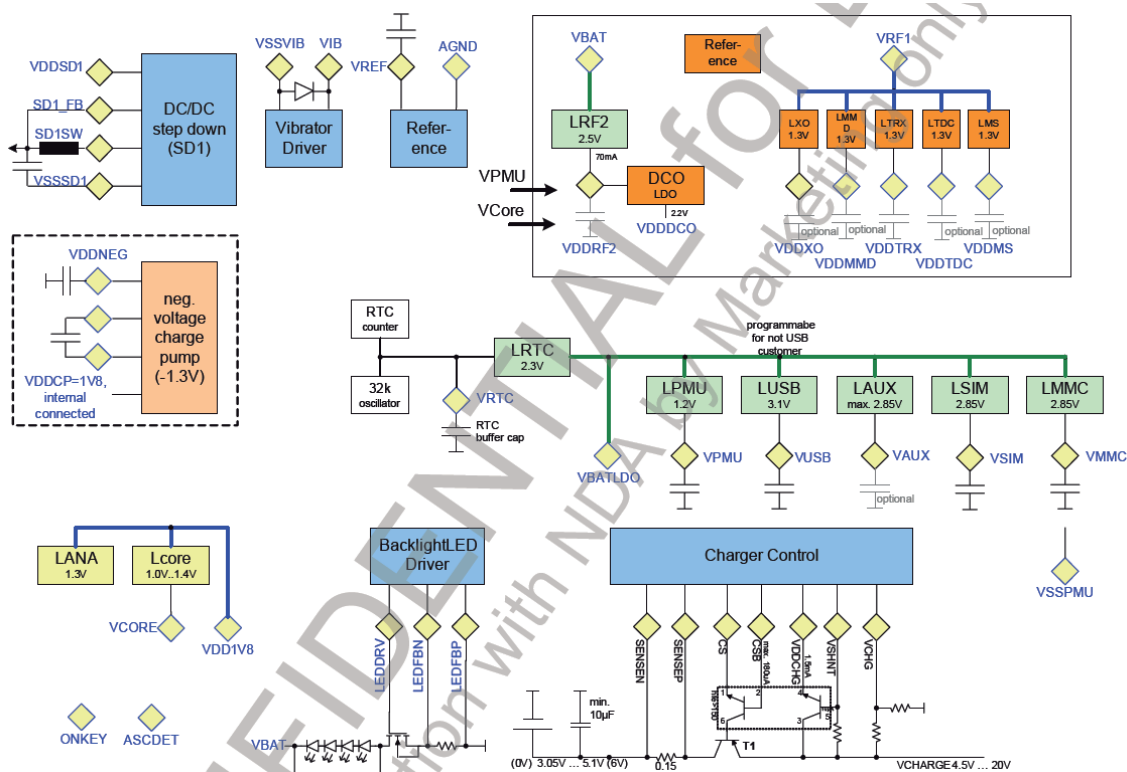


Figure. 3-2-1 Block Figure of the PMU Modules X-Gold tm 215

▪ DC/DC Step Down Converter for 1.8V (SD1)

The DC/DC converter generates a 1.8V supply rail. This voltage rail is used to supply main parts of the system, like the digital core of the chip (via LDO LCORE), some parts of the mixed signal macro, parts of the RF macro and the external memory if a 1.8V memory is used. The efficiency of the DC/DC converter is optimized for an average load current of 100mA. That is the load current estimated for the GSM talk mode.

▪ **Linear voltage Regulators (low dropout) LDOs**

The LDOs are used to generate the supply for the different supply domains not directly supplied out of the DC/DC converter.

▪ **LCORE**

The LCORE LDO provides the VCORE supply used for most of the digital parts of the chip

▪ **LPMU**

The LPMU provides VPMU supply for the PMU supply, e.g. for the startup state machine and analog parts like ADC, sense amplifier etc.

▪ **LUSB**

The LUSB LDO generates the supply for the USB transceiver (output driver and input). If no USB interface is required, LUSB can be used as general purpose LDO.

▪ **LAUX**

The LAUX generates VAUX. It is a general purpose LDO and can be used for different functions depending on the phone application, e.g. for the display or Camera.

▪ **LMMC**

The LMMC generates VMMC. It is a general purpose LDO and can be used e.g. for memory cards

▪ **LSIM**

The LSIM LDO generates the VSIM supply for the SIM card and interface. It is designed to supply Standard SIM cards.

▪ **Other LDOs**

The RF module has implemented several LDO's for different RF Power domain.

The mixed signal module has some LDO's for the audio driver and microphone supply.

The FM receiver has an internal LDO for sensitive RF circuits.

Supply Domain LDO Name	Voltage	Max. Current	Output Cap	Input Domain	Comment
VBAT	0 ... 6.0 V				Operating range is 3.05 V ... 5.5 V, system emergency switch off voltage is about 2.8 V
VDD1V8	1.8 V	450 mA	22 μ F	VBAT	This voltage is generated by the DC/DC converter with 3.3 μ H inductor, The voltage is used for: Memory supply, and via LDO's for digital core supply, mixed signal supply and RF supply.
LCORE	1.2 V	300 mA	2x100 nF	VDD1V8	
LANA	1.3 V	10 mA	No	VDD1V8	No ball
LRTC	2.3 V	2 mA	≥ 100 nF	VBAT	This supply is only used for the HPBG, the 32.768 kHz oscillator and the real-time clock counter required during the sleep- and low-power mode.
LPMU	1.2 V	15 mA	100 nF	VBAT	Supply for the digital part of the PMU including digital control of DC/DC converter. This voltage is also used for the N-DEMOS driver of DC/DC converter and the class-D amplifier and the core PLL.
LUSB	3.1 V	40 mA	100 nF	VBAT	Used for the USB driver supply or as general purpose LDO with programmable output voltages (2.5 V, 2.85 V, 3.1 V)
LAUX	1.5 V ... 2.85 V	150 mA	470 nF	VBAT	General purpose LDO for e.g. Display, Bluetooth, Camera etc. Programmable output voltages are (1.5 V, 1.8 V, 2.5 V, 2.85 V)
LSIM	1.8 V / 2.85 V	30 mA	≥ 100 nF	VBAT	LDO dedicated to the SIM-Card supply. It is chip internal connected to the SIM interface driver.
LMMC	1.5 V ... 2.85 V	150 mA	≥ 470 nF	VBAT	General purpose LDO, targeted for MMC/SD card supply.
VDDNEG	-1.3 V	100 mA	100 nF	VDD1V8	Negative voltage for the bipolar headset audio driver. Generated by a charge pump.

Table. 3-2-1 Power supply Domains (without RF)

3.2.1 Power on and startup

▪ Analog startup Circuit

Because the POR circuit and the LPBG are directly connected to the battery, it is not possible to switch them off. If the battery voltage exceed the power on reset threshold (2.5V), the power on reset is released, the LPMU regulator and the LRTC voltage regulator are switched on. The LPMU regulator starts in its ultra-low power mode.

The LPMU regulator generates a control signal (lpmu_OK) that enables the 50KHZ PMU oscillator. The output clock of the oscillator is checked with a fully coded counter. A counter overflow releases the reset (vpmu_rst_n) signal for the small PMU state-machine.

▪ Small first digital State-Machine

The small PMU state-machine is always connected to VPMU After starting from reset the small startup state machine enters the SYSTEM OFF state and only continuous the startup procedure if a switch on event like first connect, on-key, wake up or charge detect occurs.

▪ PMU-main State-Machine

The main PMU state-machine is always connected to VPMU also. The power up sequence driven by the PMU state-machine can be seen in Figure18. After enabling the reference (HPGB) and waiting for the settling time, the battery voltage is measured and compared with the power on threshold. If the battery voltage is high enough, the SD1 DC/DC converter and the LCORE LDO are started. A timer ensures that the supply voltage will be stable before the DCXO is enabled. The DCXO settling time is ensured using a fixed timer. After an overflow of this timer, the reset is released for the rest of the system. The PMU state machine remains in this System-ON state until the system is switched into the OFF state. For example the system sleep mode is completely configured by software(for example switching off the LDO's, switching of the DCXO etc.) and controlled by the VCXO_enable signal. The reason for the startup is stored in the ResetSourceRead register.

▪ Battery Measurement

The ADC and the oscillator for the ADC needs the VDD_ADC supply voltage from the LADC LDO. LADC uses either the charger voltage VDD_CHARGE or VDDRTC as input voltage. The input voltage is selected automatically by a bulk switch circuit. LADC, the ADC and the oscillator are enabled on request for every battery measurement if the charger unit is not running. This is handled by an ADC control block in one of the state-machines. If the charger unit is running the ADC is controlled by the charger state-machine

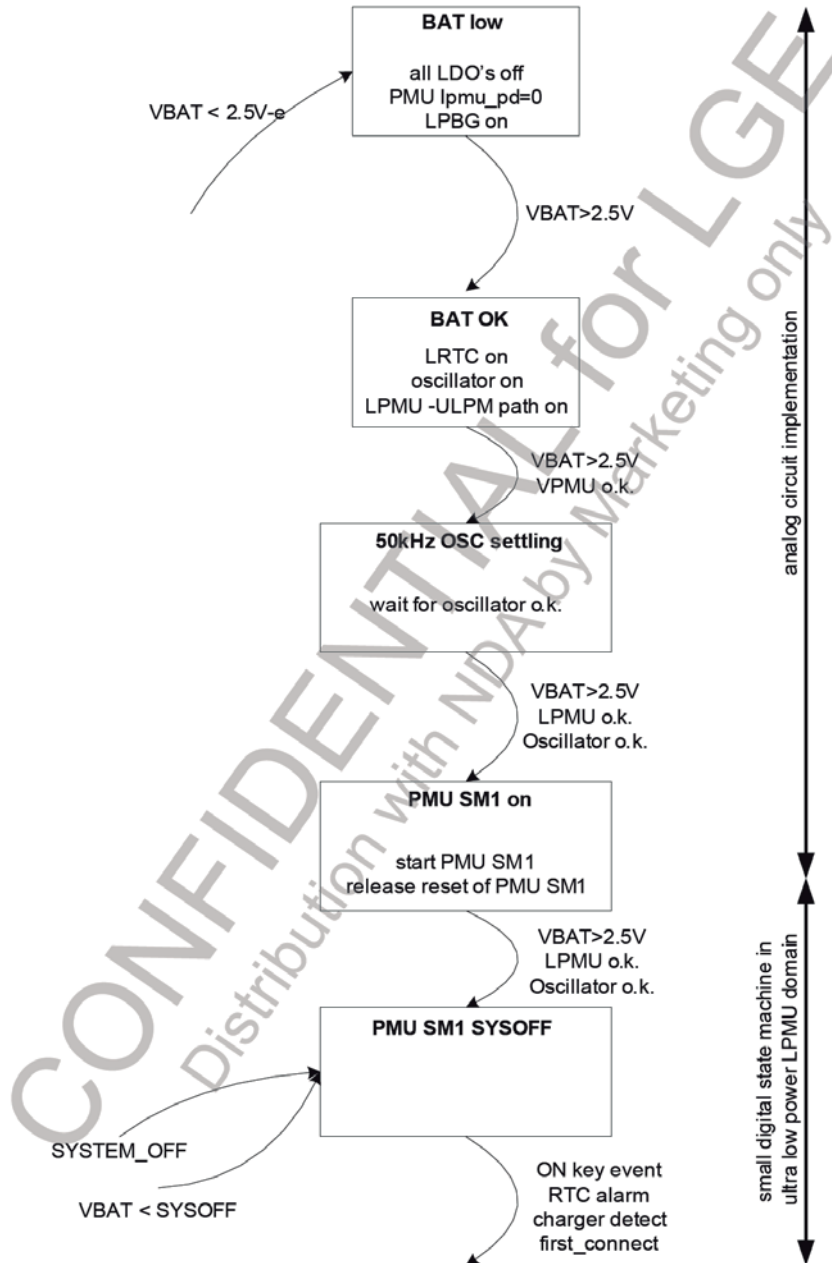


Figure.3.2.1 First Part of the State Machine, Running in Different Power Domains than the Second Part

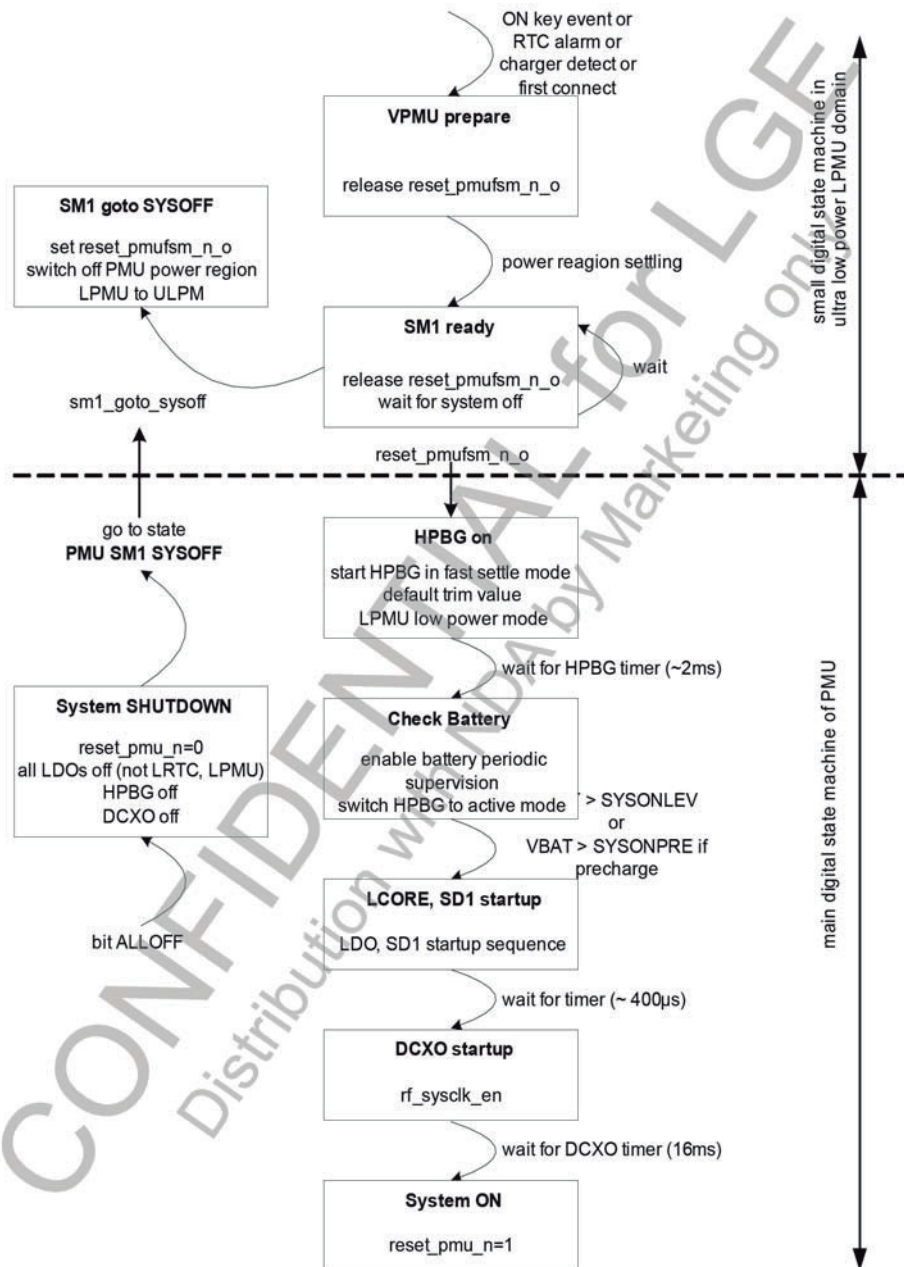


Figure 3.2.2 Second (Main) Part of the Startup State Machine in the VPMU Domain

3.2.2 Switching on due to first connect

If the battery voltage is connected the first time, that means the system enters the first time the SYSOFF state, this is stored in a first connect flag. If the first connect flag is set, the system will start immediately and not wait for any other system on event in the SYSOFF state.

3.2.3 Switching on due to on-Key event

The on key is connected to the ONKEY pad. The ESD protection and the input structure of this pad are connected to VRTC. If the ONKEY pad is forced to VRTC by an external key or similar circuit, the system starts. The ONKEY is sampled with the PMU clock. It has to be sampled four times high before a valid on event is generated. The status of the ON key can be read in the PMU registers, so it can be used as a functional key during phone operation also.

3.2.4 Switching on due to RTC alarm

The real time clock can generate a wakeup signal called RTC alarm. This signal is sampled from the state-machine and after successfully detecting a high, the system is switched on.

3.2.5 Switching on due to charging

When a battery with a voltage below the SSONLEV level is inserted, the state machine will not start the system. As long as the battery voltage stays lower than SYSONLEV the system will stay off. The only possibility to start up the system is due to an external charger.

If an external charger is connected and detected and the battery is charged above the SYSONPRE voltage level the system will start up.

The PMU main state machine waits in the Check battery state until the battery voltage condition is fulfilled. The charger state machine provides the necessary pre-charge indication signal. This pre-charge signal is denounced in a small counter to have a stable signal. This is important, especially in half/full-wave charging where the charger detection is switching between charger detected/not detected according the AC supply frequency. Reasons

For details on pre-charging see the charger chapter. The charger is controlled by an independent state machine. The pre-charge signal is used to trigger the pre-charge signal is used to trigger the pre-charge functionality. The charger state machine fully control the pre-charge, the PMU-state machine now changes to state HPBG on state and the system starts. This state change is indicated to the charger state-machine to enable the charger watchdog for safety.

3.2.6 Power Supply Start-up sequence

In order to avoid an excessive drop on the battery voltage caused by in-rush current during system power-on, possibly leading to system instability and “hick-ups” a staggered turn-on approach for the regulators is implemented. The regulators are turned on in a well defined sequence, thus spreading the in-rush current transients over time.

The IO's of X-GOLD TM 215 are isolated in OFF mode (core supply is off). The isolation signal is controlled by the PMU state machine. This ensures that the PADs are in a well defined state during core supply settling. This allows to power up the LCORE core regulator and wait for the core to reach reset state before powering up the I/O supply regulators.

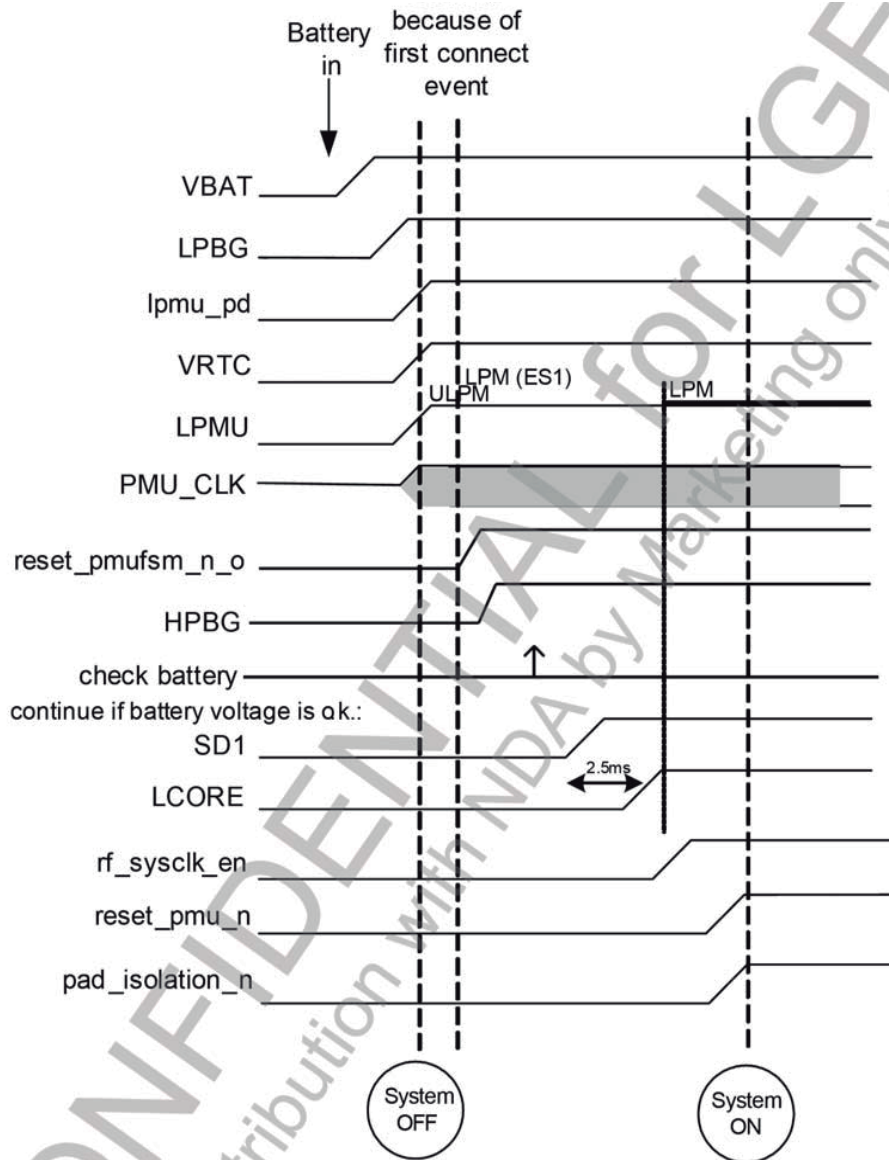


Figure 3.2.3 Start Up Sequence (triggered by First Connect Event)

3.2.7 External Reset Handling

The chip reset can be controlled by an external RESET_N ball. If this ball is pulled low, the chip will be reset. All PMU registers are reset during the external reset including LSIM control bits. The PMU statemachines are also not reset from the external reset. An SW or watchdog reset will not reset the PMU registers.

A SW and Watchdog reset is seen on the reset_n pad to allow the reset of external devices. Basically there are three reset sources, first the reset signal controlled by the PMU (reset_pmu_n_o), second the reset signal controlled by the SCU (resetout_o) and third the external reset (RESET_N).

The SCU reset is triggered by SW (for example due to a SW reset or watchdog reset). The PMU reset is controlled by the PMU state machine. The output of the reset handling block is the reset_postscu_n_o signal. This signal controls for example the μ C subsystem and releases reset for the controller. During normal start up, the PMU releases the reset_pmu_n_o signal after entering the SYSTEM ON state.

At this time the resetout_o signal is high, the RESET_N pad is not pulled low and therefore the reset_postscu_n_o signal follows the reset_pmu_n_o signal. That means the μ C reset will be released and the μ C starts operation. If the SW triggers an external reset via the SCU, signal resetout_o will be forced to low for a certain time and RESET_N will be forced to low by the open drain driver.

At the same time the feedback to the SCU will be masked to not reset the baseband. The RESET_N pad is in the VDDRTC domain but the internal pull up is connected to the VDD_VDIG1 (1.8V) domain. That allows the pad to be used as reset for external devices running in the VDD1V8 domain. The RESET_N pad can also be used to monitor the chip internal reset condition during startup.

The open drain driver is a weak driver, that means it can be forced to high during debug from external pushing some current into the pad. In testmode signal reset_pmu_n_o is high, that means the chip reset is fully controlled from external .

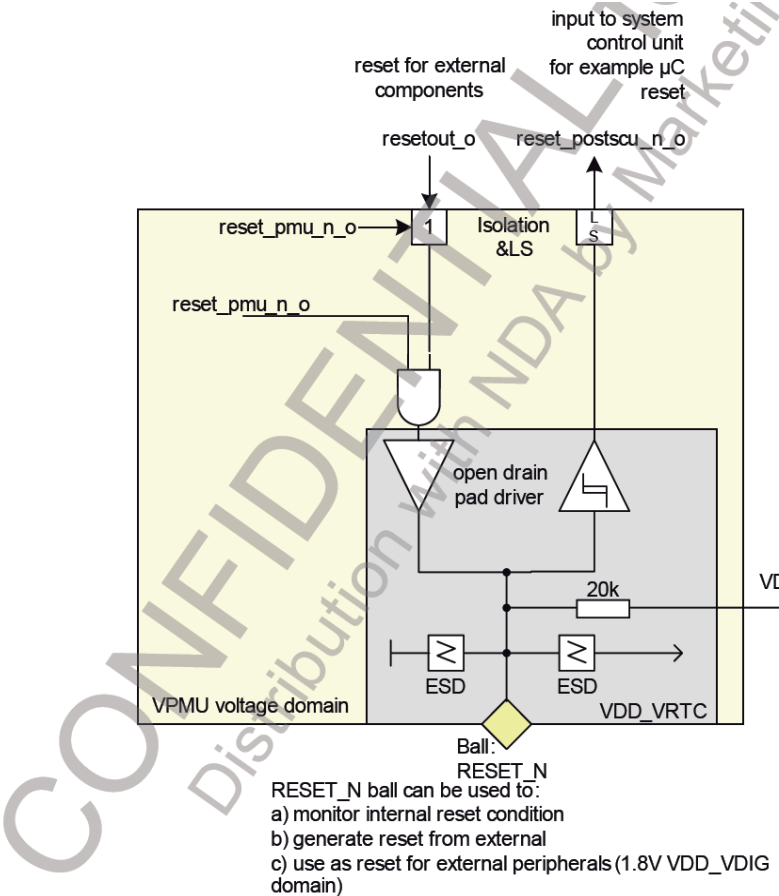


Figure 3.2.4 PMU, CGU and External Reset

3.2.8 Sysclock Switching

The PMU controls the `rf_sysclk_en` signal of the DCXO in the RF macro. During startup the PMU enables the DCXO. After the system is running the DCXO is controlled by the SCU of the baseband by using the `vcxo_enable` signal. This is handled by a dedicated logic in the PMU, see **Figure 21**. As long as `rf_sysclk_en_pmu`, the output of the PMU state-machine is high, `vcxo_enable` controls the `rf_sysclk_en` signal to the RF. If `rf_sysclk_en_pmu` is low, the DCXO is switched off, independent from `vcxo_enable`.

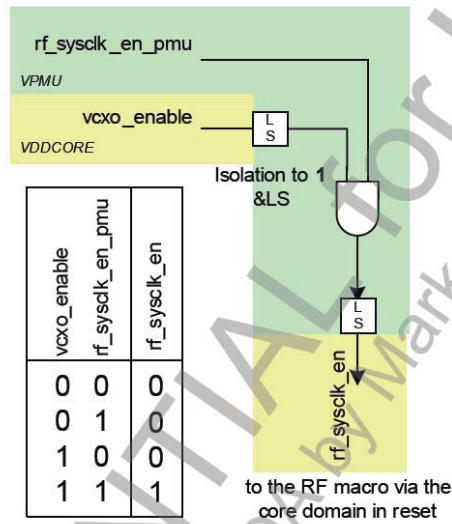


Figure 3.4.2 How sysclock Enable is Routed in the PMU

3.2.9 Undervoltage Shutdown

In active mode the PMU periodically measures the battery voltage using the ADC from the charger unit. If the battery is measured to be below the programmable shut-down level (called SYSOFF), the system changes to OFF mode. This is done via the SHUTDOWN state of the PMU state machine. (see chapter switch OFF)

3.2.10 Software Reset

A software reset does not affect any PMU register. The PMU register are reset with the `reset_pmufsm_n_o` signal. That means all PMU register are reset in OFF state. For details about the SW reset see chapter **External Reset Handling**

3.2.11 PMU Clock

During the first startup (for example plugging in a battery) a PMU internal oscillator is used for generation of the PMU clock (pmu_clock). The frequency is slightly above 32 kHz (typ. 50 kHz) to be out of the audio band also for worst case devices. After first startup the software shall enable the 32 kHz crystal oscillator. It is not possible to use the 32 kHz oscillator during first startup, because the settling time of the oscillator can be quite long. After the 32 kHz oscillator is running and settled the software shall switch the PMU clock to the 32 kHz clock and disable the internal PMU oscillator for power saving reasons. The 32 kHz oscillator shall never be disabled after the PMU clock has been switched. The ADC in the charger unit has it's own oscillator generating a frequency of about 10 MHz. This oscillator is running during charging and during battery measurements triggered by the PMU. It is off otherwise.

3.2.12 System Sleep Mode

The sleep mode is controlled by using the VCXO_enable signal. This signal is used to switch the LDO's and the DC/DC converter SD1 in a programmable way into its low power mode (PFM). In addition DC/DC converter SD1 can be configured to change the output voltage to a lower value for additional power saving. VCXO_enable is also used to deactivate the HPBG and setting LDO LPMU in the ultra-low-power mode. In addition the DCXO is switched off by the VCXO_enable signal. The VCXO_enable signal is also used to switch some LDO's (software configured) to sleep and/or off mode or to change the output voltages of said LDO's. The state of the main PMU state machine is not changed due to VCXO_enable.

3.2.13 DC/DC Pre-Load Register Handling

The DC/DC converter works in different modes. If the mode is switched from PFM to PWM the pulse-width of the DC/DC converter depends on the current battery voltage (and on the output voltage). The PMU state-machine knows the battery voltage because of the battery supervision function. Depending on this value it selects a startup pulse-width for the DC/DC converter out of a register table. (4-values)

3.2.14 Power Down Sequence

Setting bit OFF in the GeneralControl register switches the system into OFF mode. After the turn off event, the state-machine switches to the SHUTDOWN state. The reset_pmu_n_o signal changes to low, the I/O pads are isolated using the padisolation_n signal, the LDO LPMU and the SD1 DC/DC converter are switched off, the LPMU LDO is switched to ultra-low power mode, the DCXO is turned off and the bandgap buffer is disabled. Before switching OFF the software shall have enabled the 32 kHz oscillator and has switched the PMU clock to the 32 kHz clock to archive the target OFF current .

3.3 FEM with integrated Power Amplifier Module (SKY77550, U400)

3.3.1 Internal Block Diagram

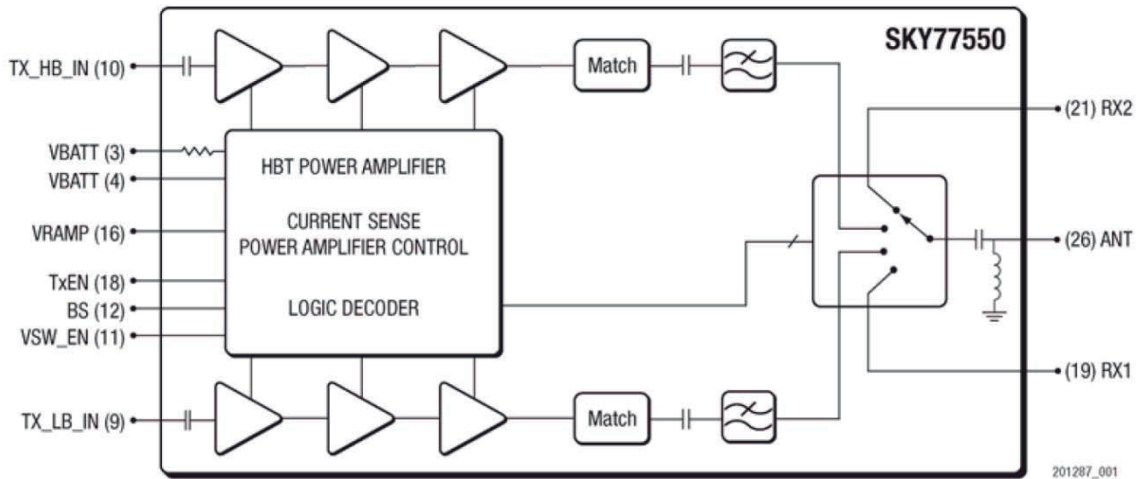


Figure. 3-3-1 SKY77550 FUNCTIONAL BLOCK DIAGRAM

3.3.2 General Description

Skyworks latest front-end modules (FEM) for GSM applications with integrated power amplifier control (iPAC™) provide a high level of integration, high efficiency, ease of application, and smaller packaging. The new BiFET control circuit improves the output RF spectrum and simplifies the calibration process. This Application Note aids phone manufacturers with implementing the latest Skyworks SKY77550 iPAC™ Front-End Module.

A Skyworks iPAC™ FEM consists of a PA lineup block, a PAcontrol block, impedance matching circuits, harmonic filtering, and a switch. Embedded in a single Gallium Arsenide (GaAs) die, one Heterojunction Bipolar Transistor (HBT) PA lineup supports the GSM850/900 bands and another supports the DCS1800 and PCS1900 bands.

A BiFET block provides the internal PAC function and interface circuitry. The front-end, with switches and diplexer, provides a single antenna port and low insertion loss receive paths for two Rx ports.

Mode	Input Control Bits		
	VSW_EN	TxEN	BS
STANDBY	0	0	0
Rx1 ¹	1	0	0
Rx2 ¹	1	0	1
Tx_LB	1	1	0
Tx_HB	1	1	1

¹ Rx1 and Rx2 are broadband receive ports and each supports the GSM850, GSM900, DCS, and PCS bands.

Figure 3.3.2 Band SW Logic Table

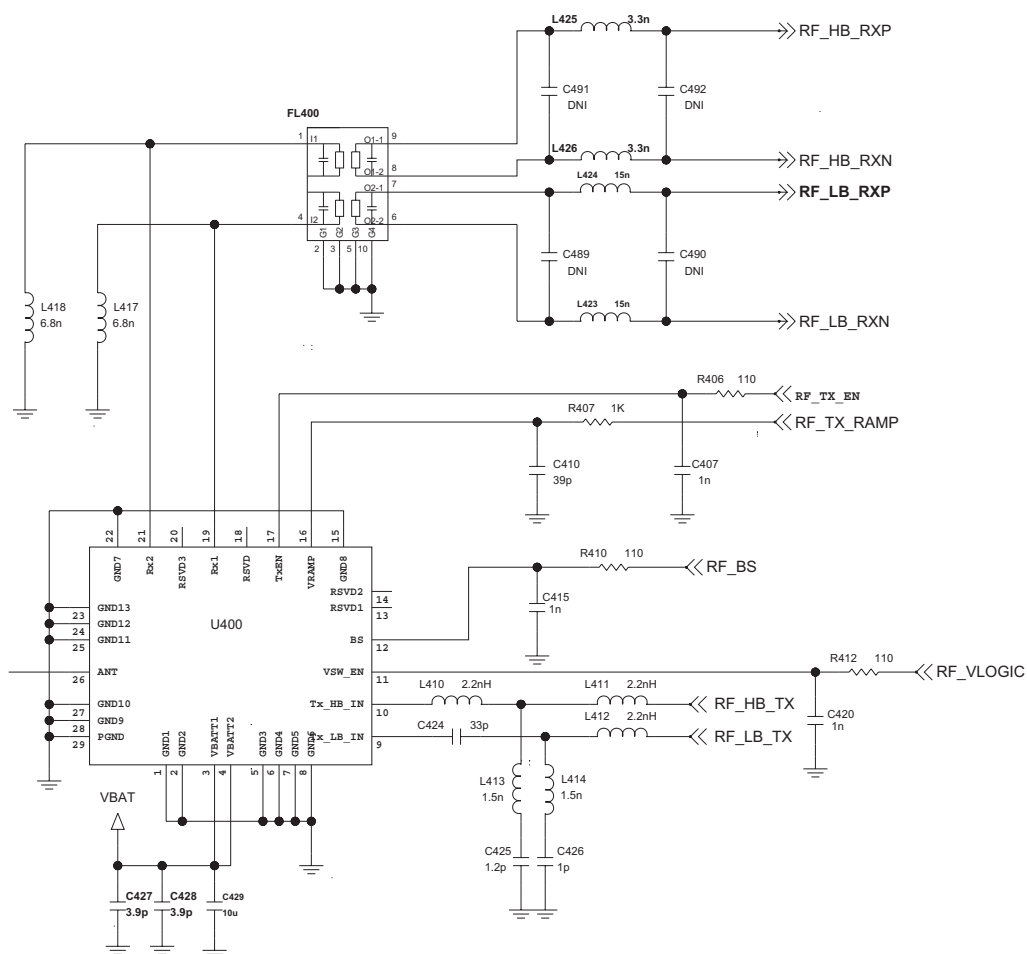


Figure 3.3.3 FEM CIRCUIT DIAGRAM

3.4 Crystal(26 MHz, X100)

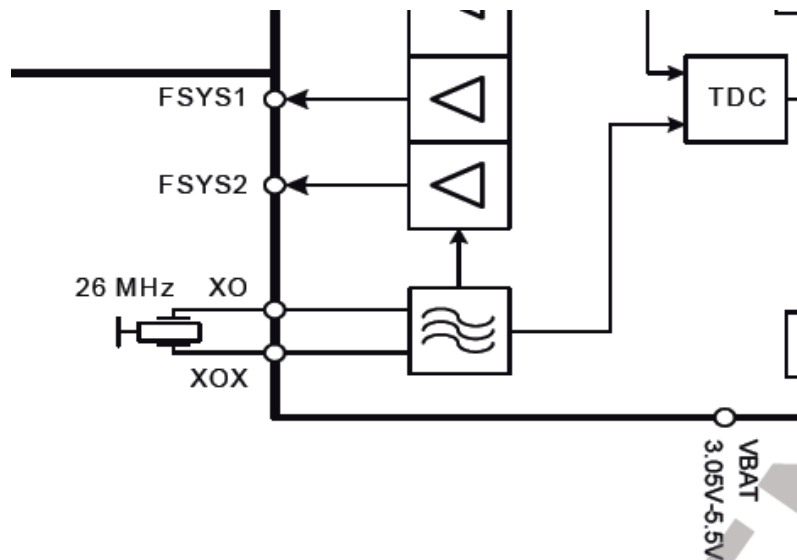


Figure. 3.4.1 Crystal Oscillator External Connection

The X-GOLDTM215 RF-Subsystem contains a fully integrated 26 MHz digitally controlled crystal oscillator, designed for 8 pF crystals. The only external part of the oscillator is the crystal itself. Overall pulling range of the DCXO is approximately ± 55 ppm, controllable by a 13-bit tuning word.

This frequency serves as comparison frequency within the RF-PLL and as clock frequency for the digital circuitry.

The 26 MHz reference clock can also be applied to external components like Bluetooth or GPS, via the two buffered output signals FSYS1 and FSYS2

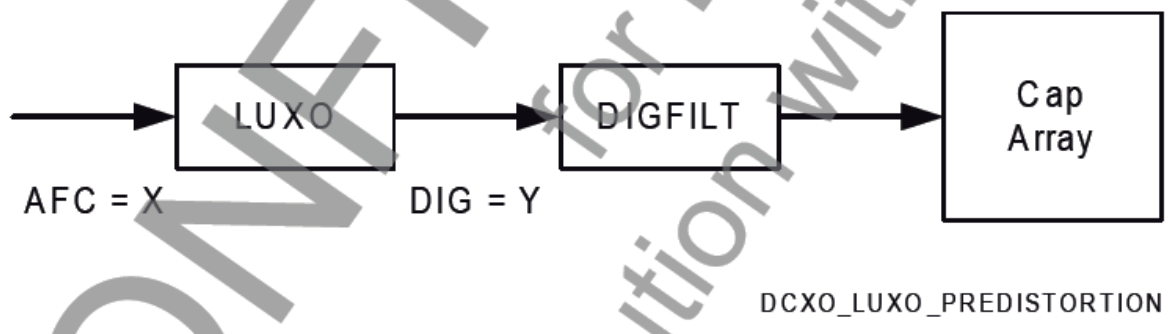


Figure. 3.4.2 Digital PREDISTORTION with LUXO

The DCXO tuning characteristic should be a first order linear function of the programming word AFC. The variable capacitance array is a first order linear function of the digital word DIG, which leads to a nonlinear curve ppm vs. DIG (and also a nonlinear ppm vs. AFC for DIG=AFC). In order to linearize the ppm vs. AFC curve the implementation of a predistortion is necessary.

To get the wanted linear ppm vs. AFC tuning curve some digital predistortion of the AFC word is required. This predistortion is performed by the linearization unit for crystal oscillator (LUXO). The LUXO calculates the corresponding DIG value according to the given AFC value.

3.5 RF Subsystem (U100)

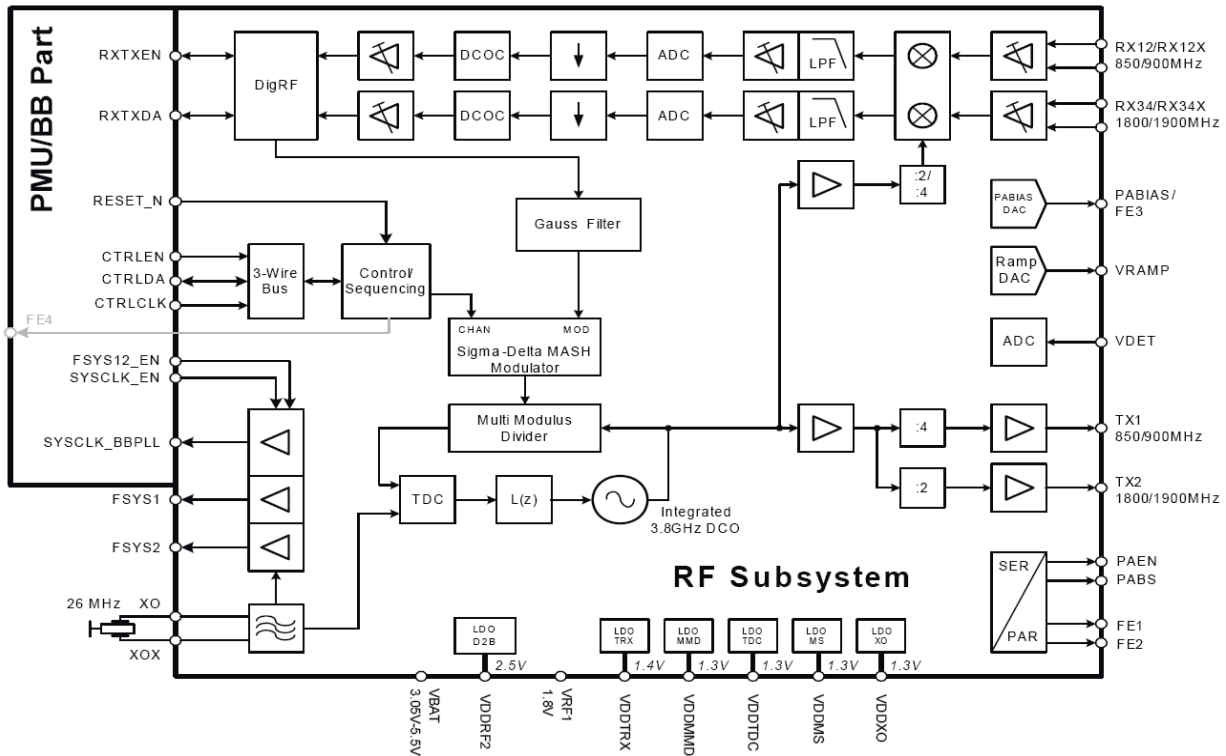


Figure. 3-5-1 Block DIAGRAM of RF Subsystem

3.5.1 GENERAL DESCRIPTION

The X-GOLD™ 215 RF subsystem is designed for dual-band GSM voice and data applications (GPRS class 12). The system can be configured to support one low band, GSM850 or EGSM900, and one high band, DCS1800 or PCS1900. A block diagram of the RF subsystem is given in **Figure 3-5-1**.

3.5.2 FUNCTIONAL DESCRIPTION

3.5.2.1 Receiver

The X-GOLD™215 dual-band receiver is based on a Direct Conversion Receiver (DCR) architecture. Input impedance of the LNAs is optimized to achieve a matching without (external) high quality inductors. By use of frequency dividers (by 2/4) the LO frequency is derived from the RF frequency synthesizer.

The receive path is fully differential to suppress the on-chip interferences and reduce DC-offsets. The analog chain of the receiver contains two LNAs (low/high band), a quadrature mixer followed by an analog baseband filter and 14-bit continuous-time delta-sigma analog-to-digital converter. The filtered and digitized signal is fed into the digital signal processing chain, which provides decimation, DC offset removal and programmable gain control.

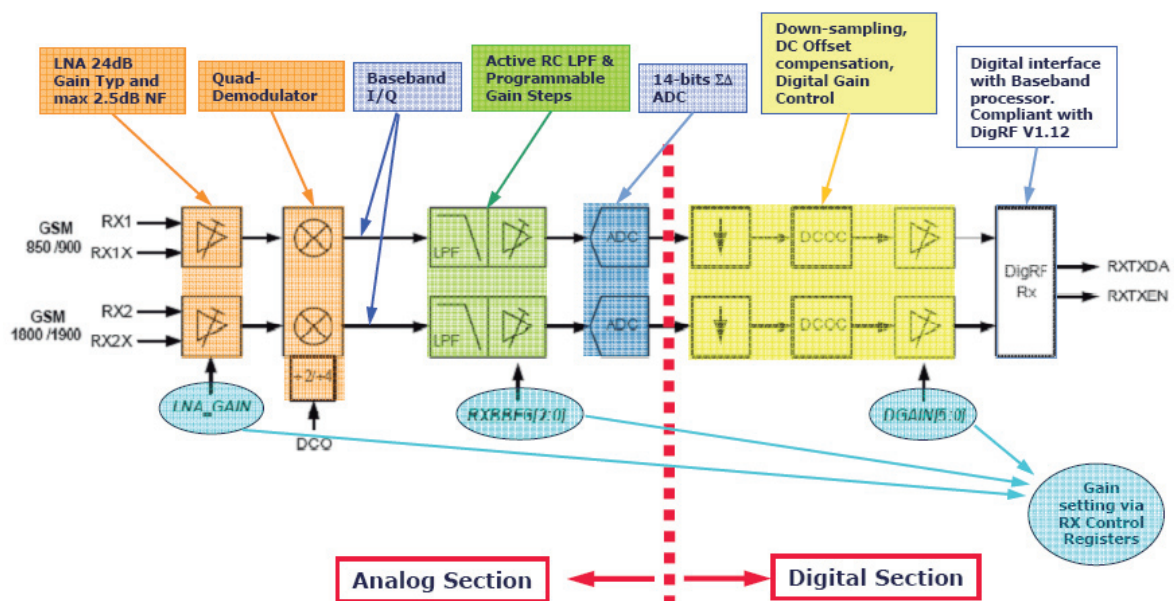


Figure. 3.5.2 RECEIVER CHAIN BLOCK DIAGRAM

3.5.2.2 Transmitter

The GMSK transmitter supports power class 4 for GSM850 or GSM900 as well as power class 1 for DCS1800 or PCS1900. The digital transmitter architecture is based on a fractional-N sigma-delta synthesizer for constant envelope GMSK modulation. This configuration allows a very low power design without any external components.

Up- and down-ramping is performed via the ramping DAC connected to VRAMP.

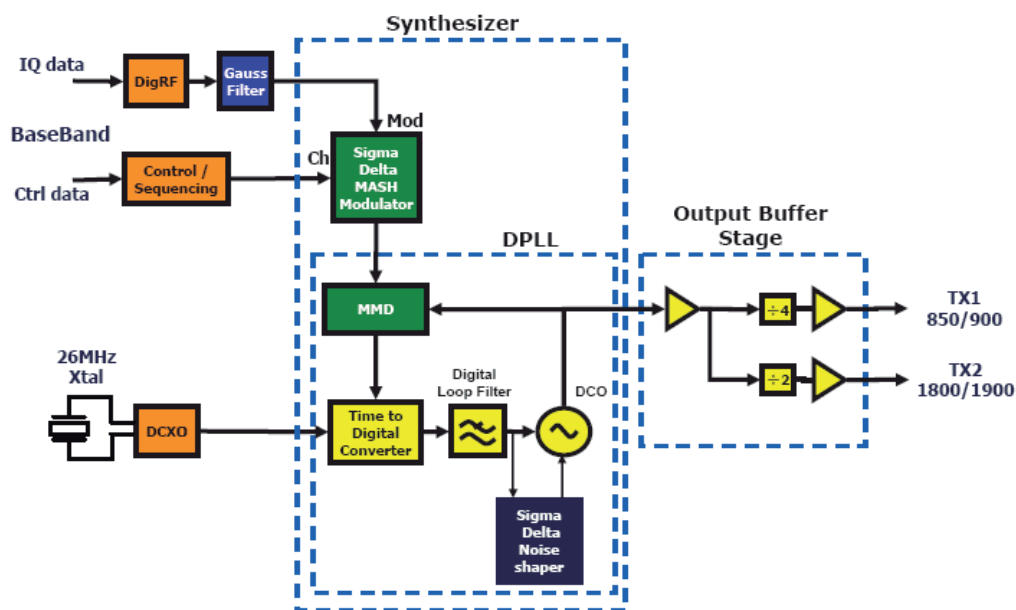


Figure. 3.5.3 TRANSMITTER CHAIN BLOCK DIAGRAM

RF synthesizer

The RF subsystem contains a fractional-N sigma-delta synthesizer for the frequency synthesis. Respective to the chosen band of operation the phase locked loop (PLL) operates at twice or forth of the target signal frequency. In receive operation mode the divided output signal of the digital controlled oscillator output (DCO) serves as local oscillator signal for the balanced mixer. For transmit operation the fractional-N sigma-delta synthesizer is used as modulation loop to process the phase/frequency signal. The 26 MHz reference signal of the phase detector incorporated in the PLL is provided by the reference oscillator.

3.5.2.3 Front-end/PA Control Interface

Two outputs (FE1, FE2) for direct control of antenna switch modules enable to select RX- and TX-mode as well as low- and high-band operation.

An extra band select signal PABS for the power amplifier is used, to support discrete PA and switching modules. Time accurate power dissipation of the PA is achieved by the control signal PAEN.

A minor set of power amplifiers require a bias voltage to enhance power efficiency. Support of this power amplifiers is achieved by the implemented bias DAC.

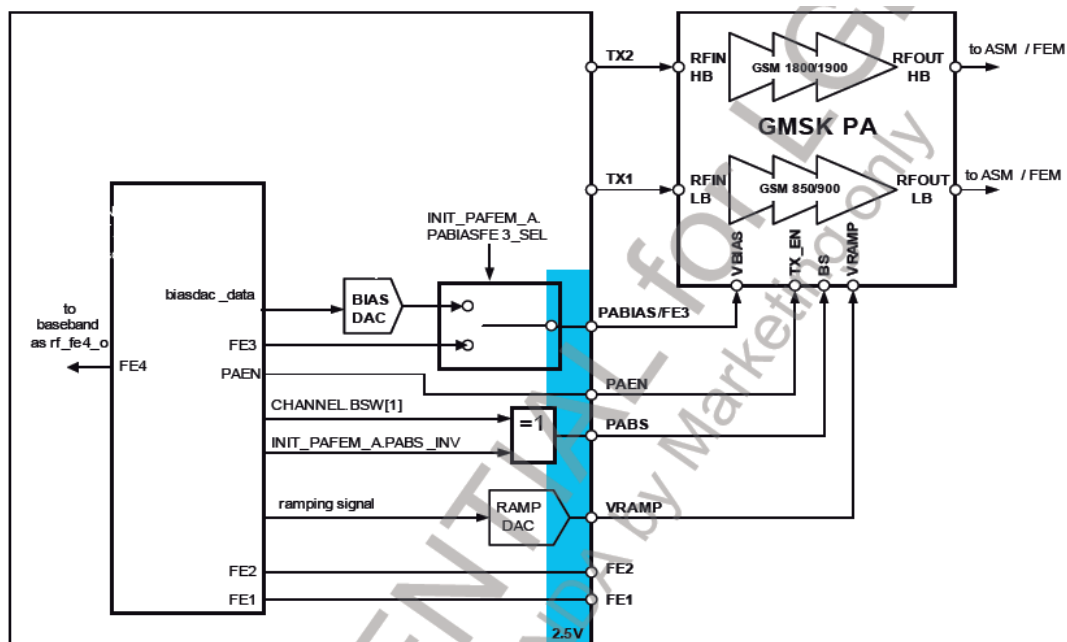


Figure. 3.5.4 PA AND FEM CONTROL BLOCK DIAGRAM

3.5.2.4 Power Supply

To increase power efficiency less sensitive parts of the RF subsystem are supplied by the DCDC converter situated in the PMU subsystem. Conversion of the 1.8 V output voltage of the DCDC to the 1.3 V/1.4 V circuit supply voltages is achieved by several Low-DropOut regulators (LDO).

One embedded direct-to-battery LDO provides the 2.5 V supply voltage for the remaining circuits.

This voltage is also used to generate a clean 1.4 V supply voltage via an additional LDO.

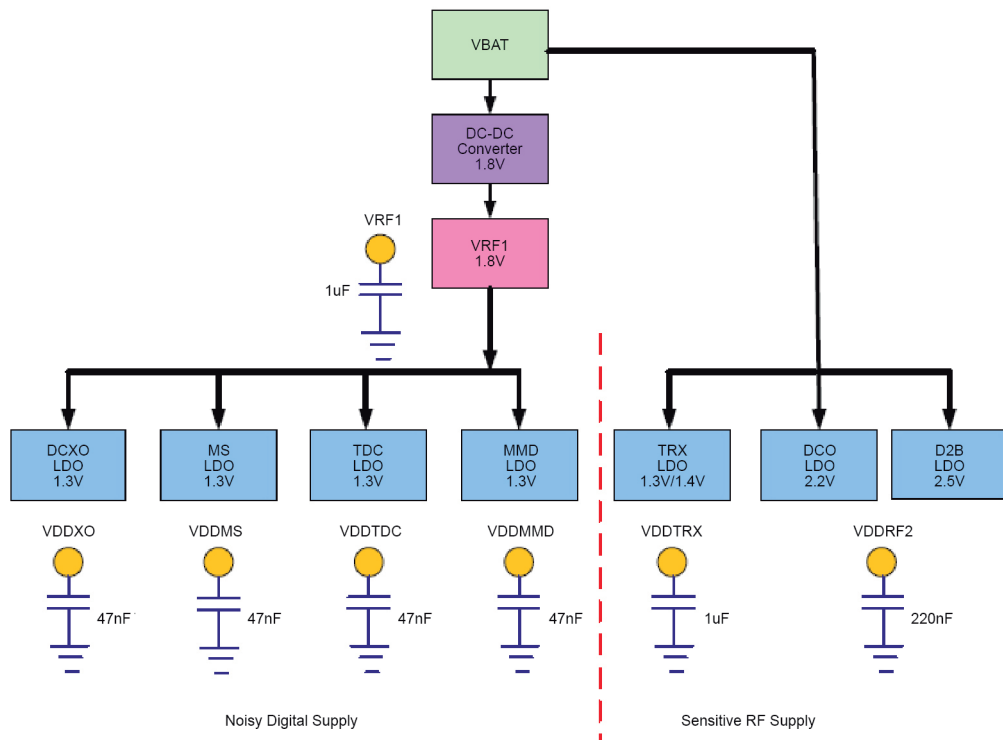
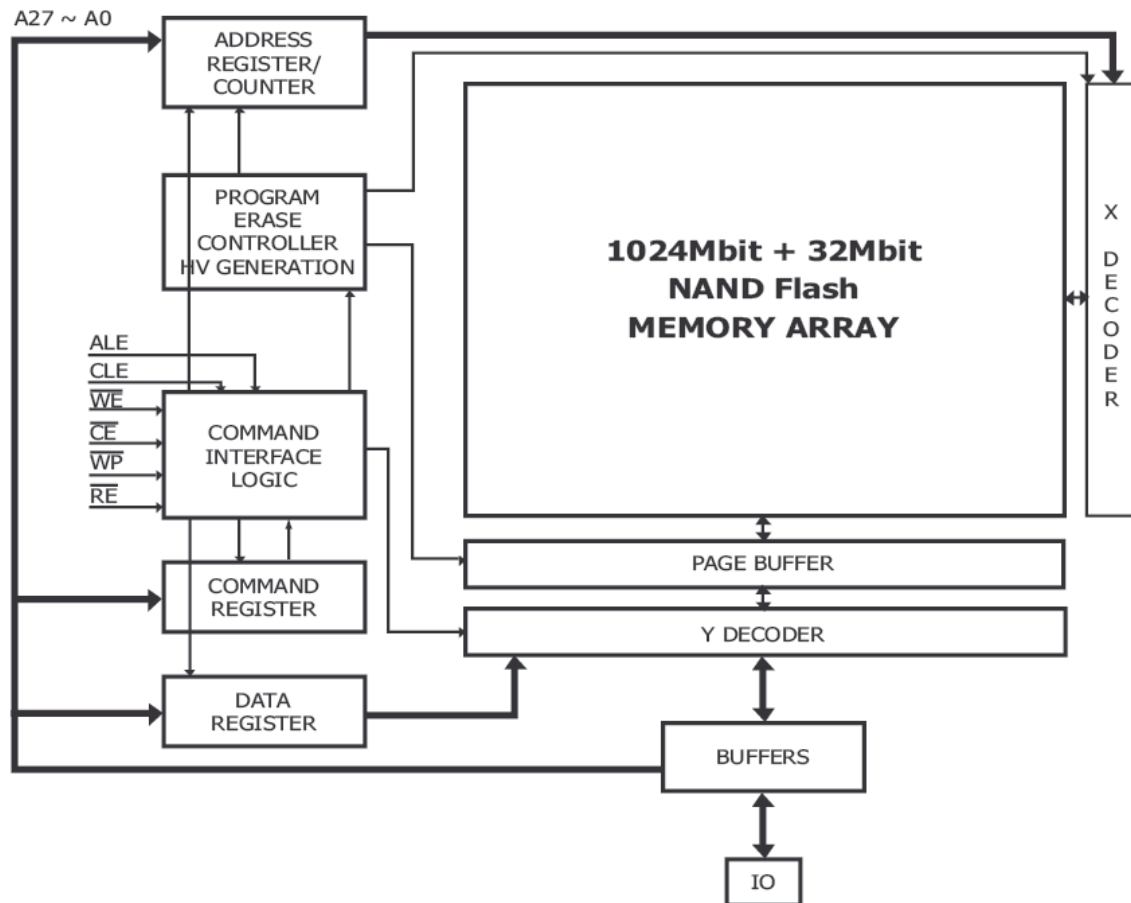


Figure. 3.5.5 POWER SUPPLY BLOCK DIAGRAM

3.6 MEMORY(H8BCS0QG0MMR, U101)**Figure. 3.6.1 MEMORY BLOCK DIAGRAM**

The device is offered in 1.8 V Vcc Power Supply, and with x16 I/O interface. Its NAND cell provides the most cost-effective solution for the solid state mass storage market. The memory is divided into blocks that can be erased independently so it is possible to preserve valid data while old data is erased.

The device contains 1024 blocks, composed by 64 pages. A program operation allows to write the 1056 words page in typical 200 us and an erase operation can be performed in typical 2.0 ms on a 128 K byte block.

Data in the page can be read out at 45 ns cycle time per byte. The I/O pins serve as the ports for address and data input/output as well as command input. This interface allows a reduced pin count and easy migration towards different densities, without any rearrangement of footprint.

Commands, Data and Addresses are synchronously introduced using CE, WE, RE ALE and CLE input pin. The on-chip Program/Erase Controller automates all program and erase functions including pulse repetition, where required, and internal verification and margining of data. The modify operations can be locked using the WP input.

The chip supports CE don't care function. This function allows the direct download of the code from the NAND Flash memory device by a microcontroller, since the CE transitions do not stop the read operation.

The output pin R/B (open drain buffer) signals the status of the device during each operation. In a system with multiple memories the R/B pins can be connected all together to provide a global status signal.

Even the write-intensive systems can take advantage of the H27S1G6F2B Series extended reliability of 100 K program/ erase cycles by providing ECC (Error Correcting Code) with real time mapping-out algorithm.

The copy back function allows the optimization of defective blocks management: when a page program operation fails the data can be directly programmed in another page inside the same array section without the time consuming serial data insertion phase. Data read out after copy back read is allowed

This device includes also extra features like OTP/Unique ID area, Read ID2 extension.

3.7 BT module

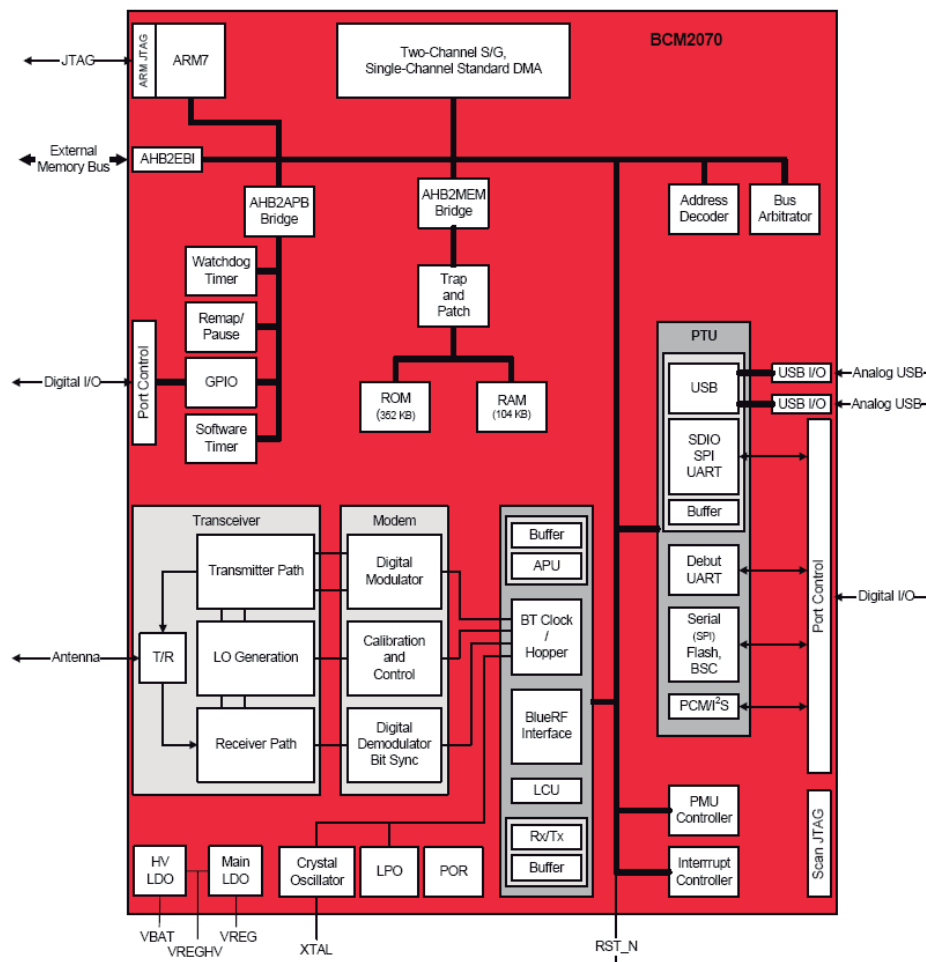


Figure 3_7_1. BT BLOCK DIAGRAM

This module has an integrated radio transceiver that has been optimized for use in 2.4GHz Bluetooth Wireless systems. It has been designed to provide low-power, robust communications for applications Operating in the globally available 2.4GHz unlicensed ISM band. It is fully compliant with the Bluetooth Radio Specification and enhanced data rate specification and meets or exceed the requirement to provide the highest communication link quality of service.

3.7.1 Transmitter path

This module features a fully integrated zero IF transmitter. The baseband transmitted data is digitally modulated in the modem block and up-converted to the 2.4GHz ISM band in the Transmitter path. The transmitter path consists of signal filtering, I/Q up-conversion, high-output power amplifier(PA), and RF filtering. It also incorporates modulation schemes P/4-DQPSK for 2 Mbps and 8-DPSK for 3 Mbps to support enhanced data rate.

• Digital modulator

The digital modulator performs the data modulation and filtering required for the GFSK, $\pi/4$ DQPSK, and 8-DPSK signal. The fully digital modulator minimizes any frequency drift or anomalies in the modulation characteristics of the transmitted signal and is much more stable than direct VCO modulation schemes.

• Power Amplifier

The integrated PA for the BCM2070 is configurable for Class 2 operation, transmitting up to +4 dBm as well as Class 1 operation and transmit power up to +12 dBm at the chip, GFSK, >2.5V supply. Due to the linear nature of the PA, combined with some integrated filtering, no external filters are required for meeting Bluetooth and regulatory harmonic and spurious requirements. For integrated mobile handset applications, where Bluetooth is integrated next to the cellular radio, minimal external filtering can be applied to achieve near thermal noise levels for spurious and radiated noise emissions.

Using a highly linearized, temperature compensated design the PA can transmit +12 dBm for Basic rate and +10 dBm for enhanced data rates(2 to 3 Mbps). A flexible supply voltage range allows the PA to operate from 1.2V to 3.0V. The minimum supply voltage at VDDTF is 1.8V to achieve +10dBm of transmit power.

3.7.2 Receiver path

The receiver path uses a low IF scheme to down-convert the received signal for demodulation in the digital demodulator and bit synchronizer. The receiver path provides a high degree of linearity, an extended dynamic range, and high order on-chip channel filtering to ensure reliable operation in the noisy 2.4GHz ISM band. The front-end topology, with built-in out-of-band attenuation, enables the device to be used in most applications with no off-chip filtering. For integrated handset operation where the Bluetooth function is integrated close to the cellular transmitter, minimal external filtering is required to eliminate the desensitization of the receiver by the cellular transmit signal.

3.8 Dual SIM Card Interface

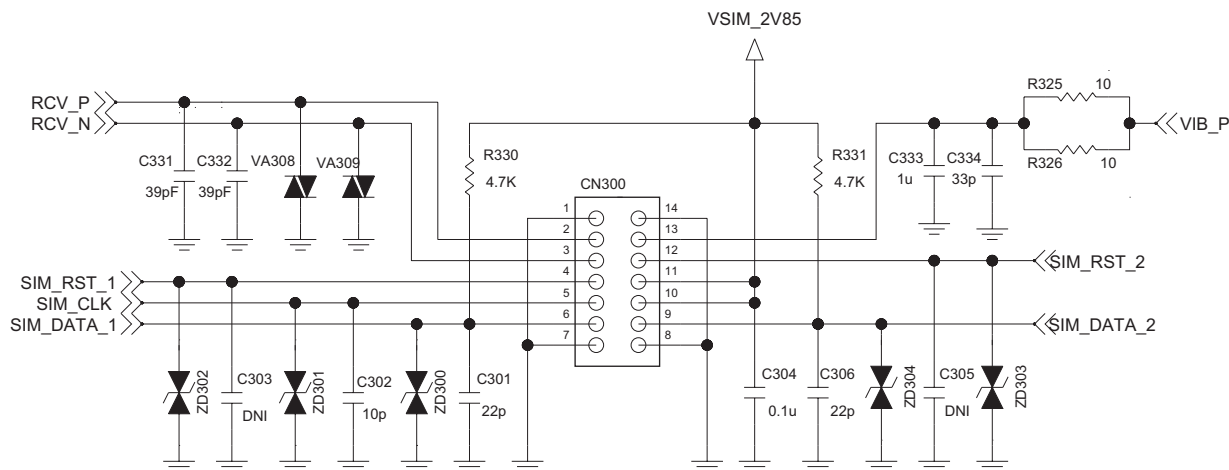


Figure 3-8-1. Dual SIM CARD Interface

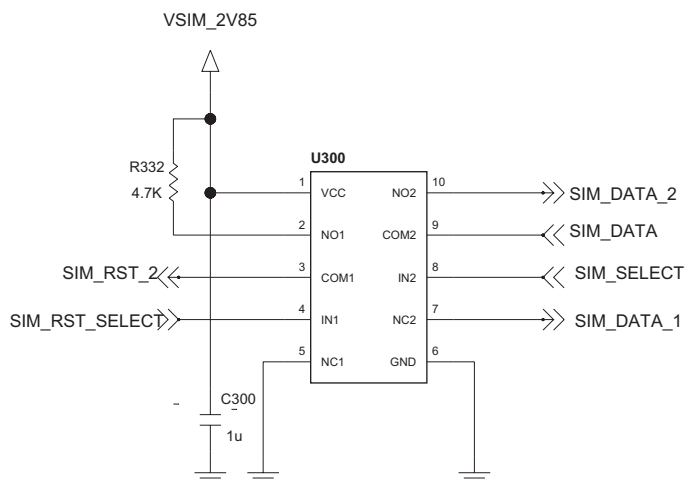


Figure 3-8-2. Dual SIM selection

Signal	Description
SIM_RST	This signal makes SIM card to HW default status.
SIM_CLK	This signal is transferred to SIM card.
SIM_DATA	This signal is interface datum.

3.9 LCD Interface

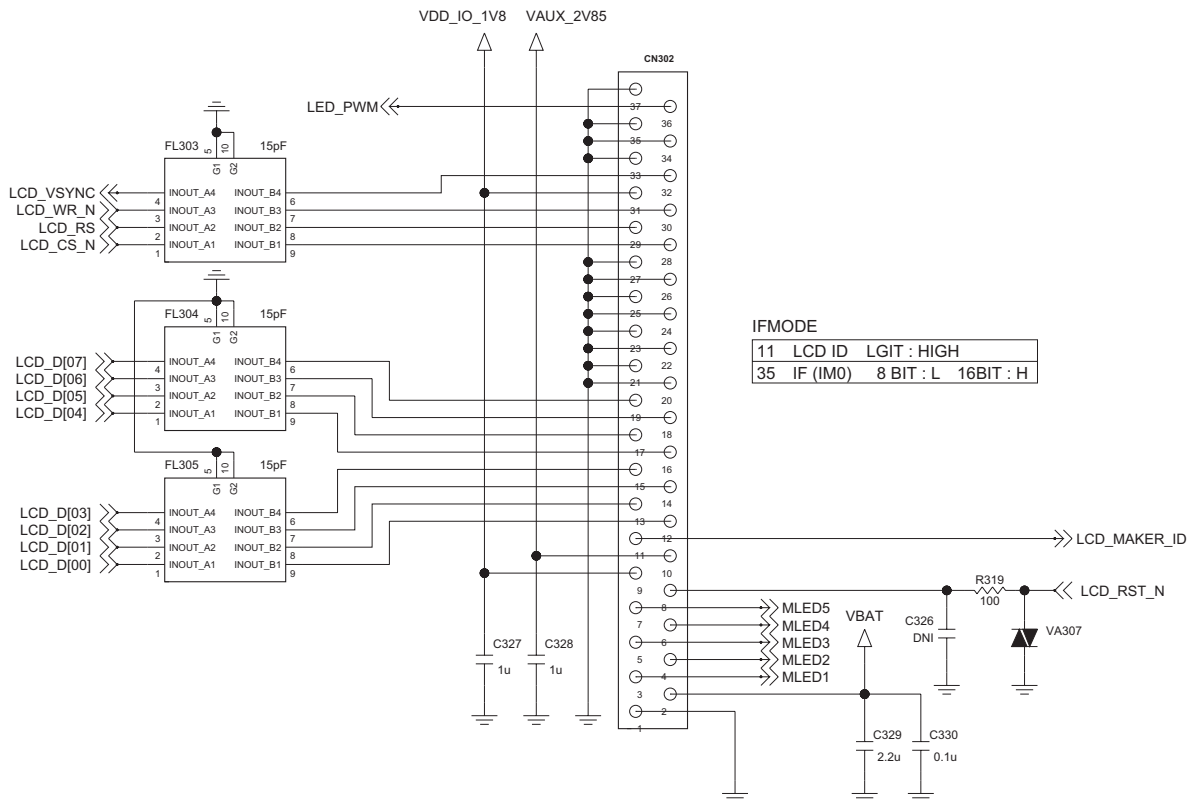


Figure 3-9-1. LCD Interface of LCD FPCB

The LH240Q40-SD14 model is a Color TFT (Main) LCD supplied by LG Display.

This main LCD has a 2.4 inch diagonally measured active display area with 240x(RGB)x320 resolution.

Each pixel is divided into Red, Green and Blue sub-pixels and dots which are arranged in vertical stripes.

Main LCD color is determined with 262K colors signal for each pixel.

The LH240Q40-SD14 has been designed to apply the interface method that enables low power, high speed, and high contrast.

The LH240Q40-SD14 is intended to support applications where thin thickness, wide viewing angle and low power consumption are critical factors and graphic displays are important.

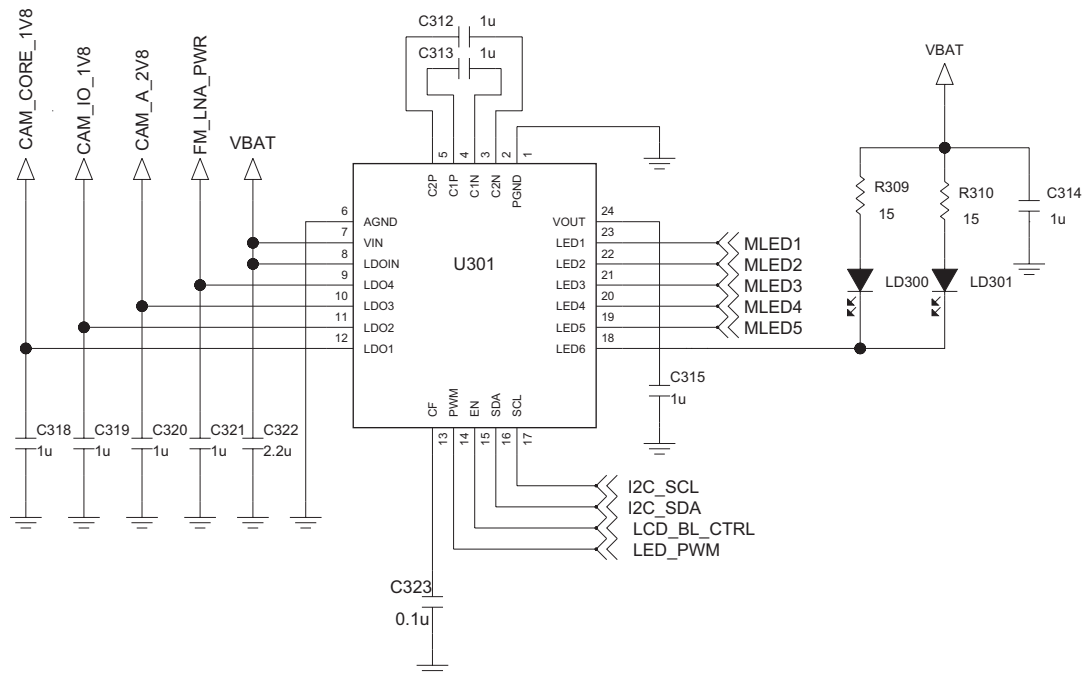


Figure 3-9-2. RT9396 CIRCUIT DIAGRAM

The RT9396 is a power management IC (PMIC) for backlighting and phone camera applications. The PMIC contains a 6-Channel charge pump white LED driver and four low dropout linear regulators. The charge pump drives up to 6 white LEDs with regulated constant current for uniform intensity. Each channel (LED1 to LED6) supports up to 25mA of current. These 6-Channels can be also programmed as 4 plus 2-Channels or 5 plus 1-Channels with different current setting for auxiliary LED application. The RT9396 maintains highest efficiency by utilizing a x1/ x1.5/ x2 fractional charge pump and low dropout current regulators. An internal 6-bit DAC is used for backlight brightness control. Users can easily configure up to 64-steps of LED current via the I2C interface control.

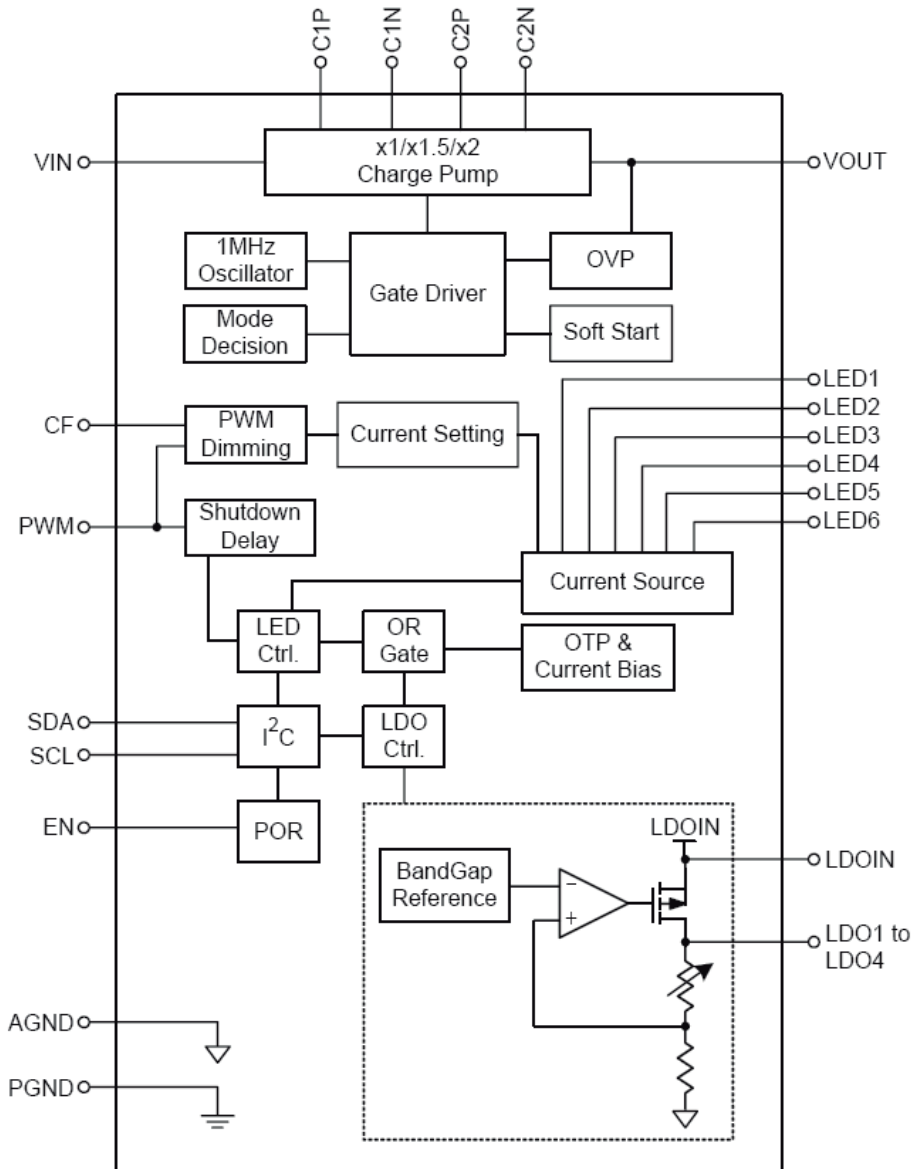


Figure 3-9-3. RT9396 FUNCTION BLOCK DIAGRAM

3.10 Battery Charger Interface

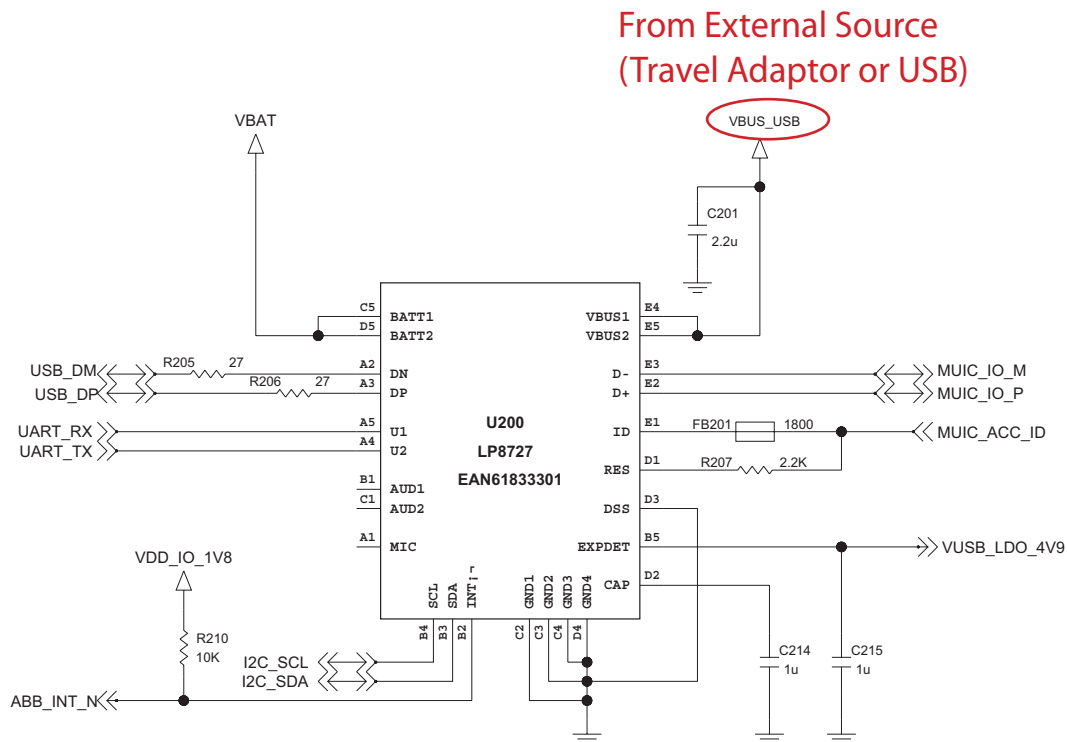


Figure 3-10-1 BATTERY CHARGER BLOCK

The LP8727 is designed to provide automatic multiplexing switches between Micro/Min USB connector and USB, UART and Audio paths in cellular phone applications, and it also contains a single-input Li-Ion battery charger and an over-voltage protected LDO.

Programming is handled via an I2C compatible Serial Interface allowing control of charger, multiplexing switches, and reading status information of the device.

The multiplexing switches on USB and UART support High-Speed USB and Audio inputs can be driven to negative voltage rail. The LP8727 is compatible with USB charging specifications rev 1.1 from USB IF.

The Li-Ion charger requires few external components and integrates the power FET.

Charging is thermally regulated to obtain the most efficient charging rate for a given ambient temperature. It has Over-Voltage Protection (OVP) circuit at the charger input protects the PMU from input voltages up to +28V, eliminating the need for any external protection circuitry.

An over-voltage protected LDO which can supply up to 50mA is designed for powering up low voltage USB transceiver or waking up a PMU (Power Management Unit) when an external power source (either USB VBUS or wall adapter) is connected to the USB connector.

The LP8727 PMU is available in 25-Bump 0.4mm pitch Thin Micro SMD package (2.015mm* 2.015mm).

3.11 Keypad Interface

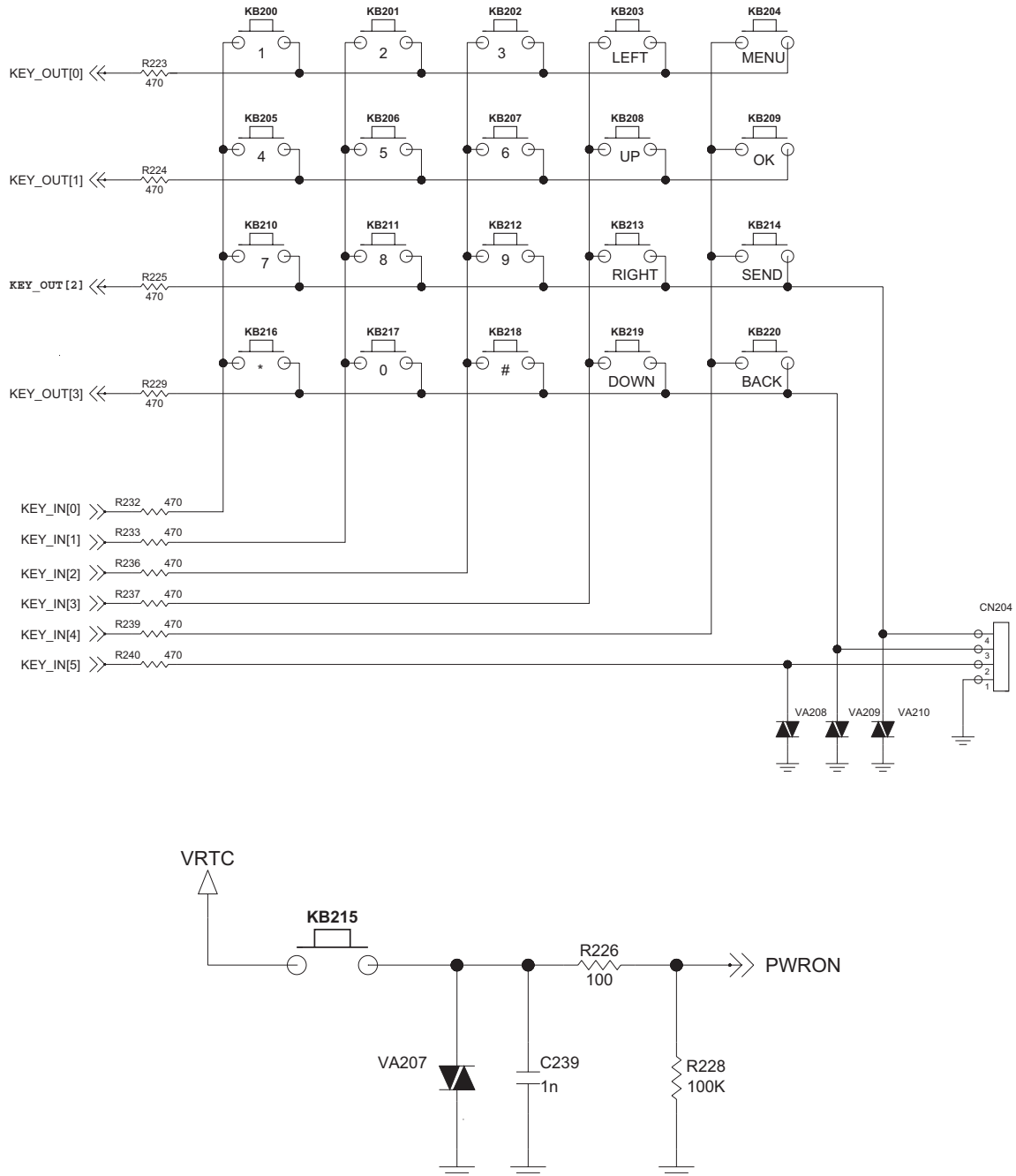
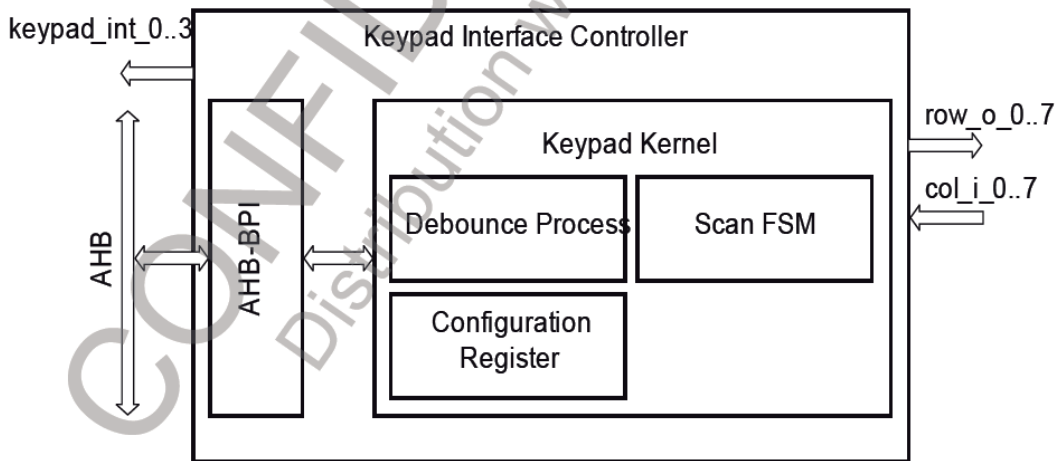


Figure 3-11-1 MAIN KEY STRUCTURE

The Keypad Interface is a peripheral controller, which can be used for scanning external keypad matrices with up to 8 rows and 8 columns (that is 64 standard keys). By adding an additional row of keys connected to ground the number of keys can be extended by up to 8 keys. This results in a maximum number of 72 keys to be identified by the Keypad Interface Controller.

The Keypad Scan Module reduces the number of interrupts and polling through the processor and therefore reduces the power consumption. The module is able to debounce and scan the external keypad matrix automatically without any software intervention. After debouncing it generates an interrupt. The interface controller contains information about the key (or key combination) that was pressed and how long it was pressed.



KEYPAD_1_OVW

Figure 3-11-3 Block Diagram and System Integration of the KPD

3.12 Audio Front-End

This section describes the content of the Audio Frontend & Measurement Sub-System (integrated Mixed-signal part).

The MS (mixed signal) part comprises the following functionality:

- Headset amplifier (uni- and bi-polar signal driver) to connect stereo headset with $2 \times 16 \Omega$ and drive $2 \times 30 \text{ mW}$
- Earpiece amplifier to connect 16Ω earpiece (mono) and drive 100 mW
- Loudspeaker amplifier (class-D) to connect 8Ω Loudspeaker (mono) and drive 700 mW
- 2 differential microphone inputs
- 2 microphone supply generators (1 ultra low power) • Charge pump for generating negative voltage in order to support bipolar audio
- Digital Microphone interface
 - One 2 MHz clock output, 2 input for Dual-Digital microphone
- Integrated FM radio
- Measurement ADC
 - Measurement of external signal applied to Measurement Interface (M0..M2)
 - Measurement of internal signals: accessory detection (signal from PMU), charge voltage (signal from PMU), auxiliary temperature sensor (signal from PMU), 1 spare port
- Temperature sensor

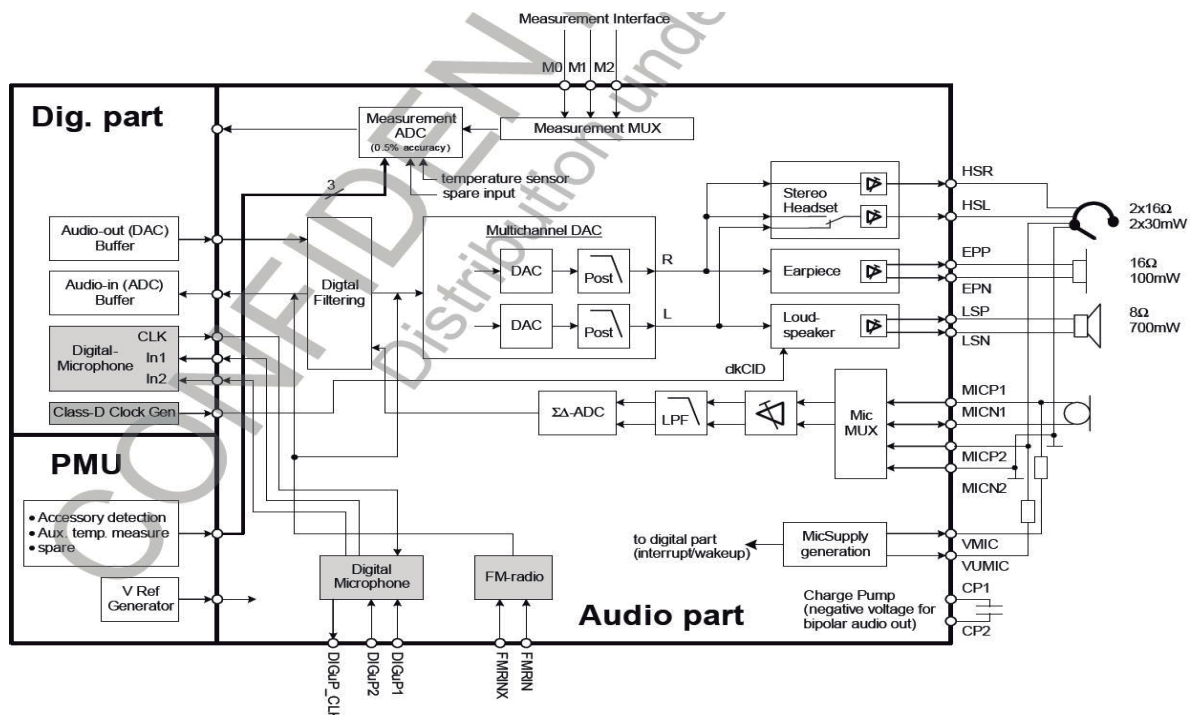


Figure 3.12.1 Audio Section Overview

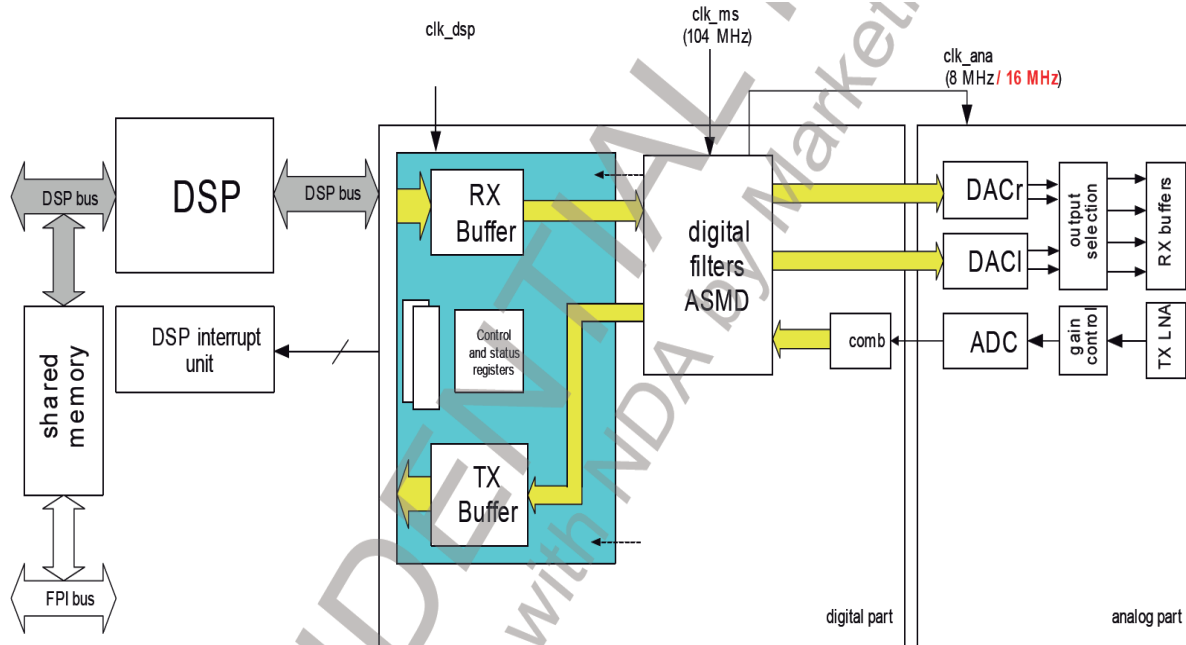


Figure 3.12.2 Overview of Clocking and Interfaces of Audio Front End

The audio front-end of X-GOLD™215 has the following major operation modes:

- Power-down: All analog parts are in power down and all clocks of the digital part are switched off.
- Audio mode: Digital decimation/interpolation filters are connected to the interface buffers and the analog part is enabled.

These major modes can be modified by certain control register settings.

- Due to the new gain settings in the TX path, the maximum input voltage is limited to 0.8 Vpp.
- In both voiceband paths, the value range for voice samples is confined to 97.5%, i.e. to [-31948, 31947] or [8334H, 7CCBH] in X-GOLD™215.
- On the TX path, 83% "1"s on the VTPDM line correspond to a 16-bit value of 7CCBH and 17% "1"s correspond to a 16-bit value of 8334H at the digital filter output. Thus the usable range is 66%. This range can be scaled to 100% by Firmware.
- The high-pass functions of the voiceband filters have to be implemented in firmware on TEAKLite®.

3.12.2 Digital Part

The digital part of the X-GOLD™213 audio front-end comprises an interface to the TEAKLite® bus, interfaces to the interrupt units of TEAKLite®, digital interpolation filters for oversampling digital-to-analog conversion, digital decimation filters for analog-to-digital conversion and an interface to the analog part of the audio front-end. For the digital microphone all the filtering is done in a dedicated hardware. The output sample stream is then fed in a duplicated ring buffer structure like the data from the analog microphone path (after A/D conversion and subsequent digital filtering).

▪ Interpolation Filter

The interpolation path of the X-GOLD™213 audio front-end increases the sampling rate of the audio samples to the rate of the digital-to-analog converter. Because the input sampling rates can vary between 8 kHz and 47.619 kHz the filter characteristic and oversampling ratio can be adjusted to the respective sampling rate. The requirements for the interpolation filters depend on the sampling rate, because a sufficient out-of-band discrimination in the audio frequency band (20 Hz,...,20 kHz) has to be ensured.

▪ Decimation Filter

The digital decimation filter on X-GOLD™213 has two operating modes: 8 kHz output sampling rate and 16 kHz output sampling rate (or 16 kHz output sample rate and 16kHz bandwidth in case of doubled ASMD clock).

3.12.3 Analog Part

The analog part of the X-GOLD™213 audio front-end in audio-out direction consists of a stereo digital to analog converter (multi-bit oversampling converter) which transforms the output of the digital interpolation filter into analog signals. It is followed by the gain control/amplifier section. The DAC outputs can be switched to several output buffers. In audio-in section there is an input multiplexer which selects either one of two differential microphone inputs to be connected to the low-noise amplifier and analog pre-filter. The signals from the analog pre-filter are input to a second-order sigma-delta analog-to-digital converter. In addition there is a connection for FM-radio playing.

▪ Audio-out Part

The analog audio-out part consists of two multi-bit digital-to-analogue converters (DAC) and an output stage. The signal sources are switched to the output drivers in the output stage. The output drivers consist of: a) one mono, differential class-D Loudspeaker driver, b) one mono, differential Earpiece driver and c) one stereo, single-ended (with uni- or bipolar signals), Headset driver.

▪ Digital-to-analog converters

The multi-bit oversampling DACs of the X-GOLD™215 audio front-end convert the 16-bit data words coming from the digital interpolation filters to analogue signals.

▪ Output Amplifier

The different output buffers in X-GOLD™215 are driven by the outputs of the selection block. The differential earpiece driver can be used to drive a 16 Ω earpiece and works in differential. The two single ended headset drivers can be used to drive a 16 Ω headset. They can work unipolar mode, where an AC coupling of the headset might be needed, or can work also in bipolar mode. The differential loudspeaker driver can be used to drive a 8 Ω loudspeaker. As it is a class-D amplifier the needed suppression of the higher harmonics of the switching signals has to be achieved by the external circuitry. The buffers are designed to be short circuit protected.

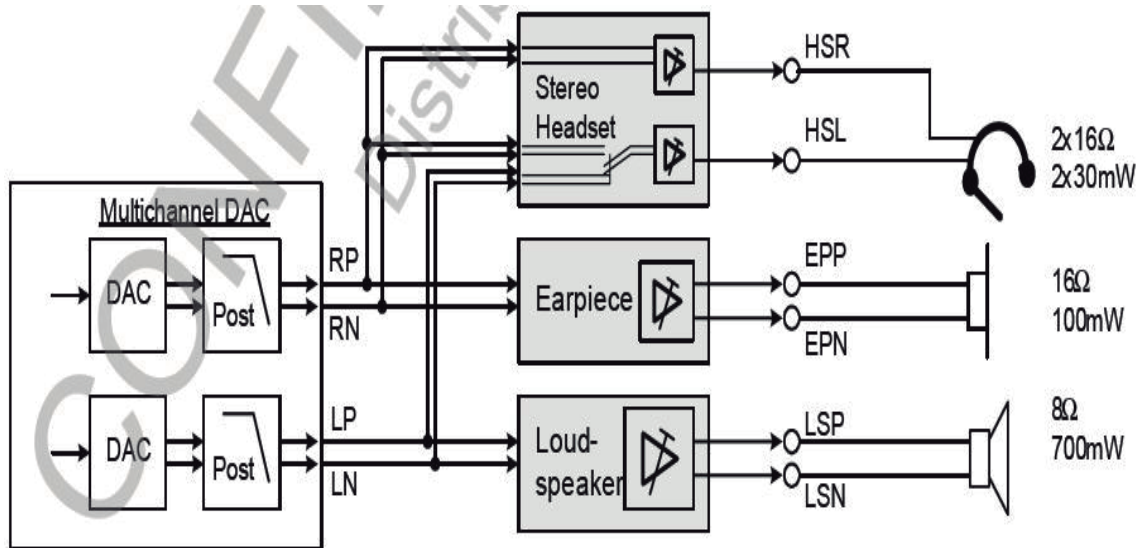


Figure 3.12.3 Switching for R/L DACs onto Buffers

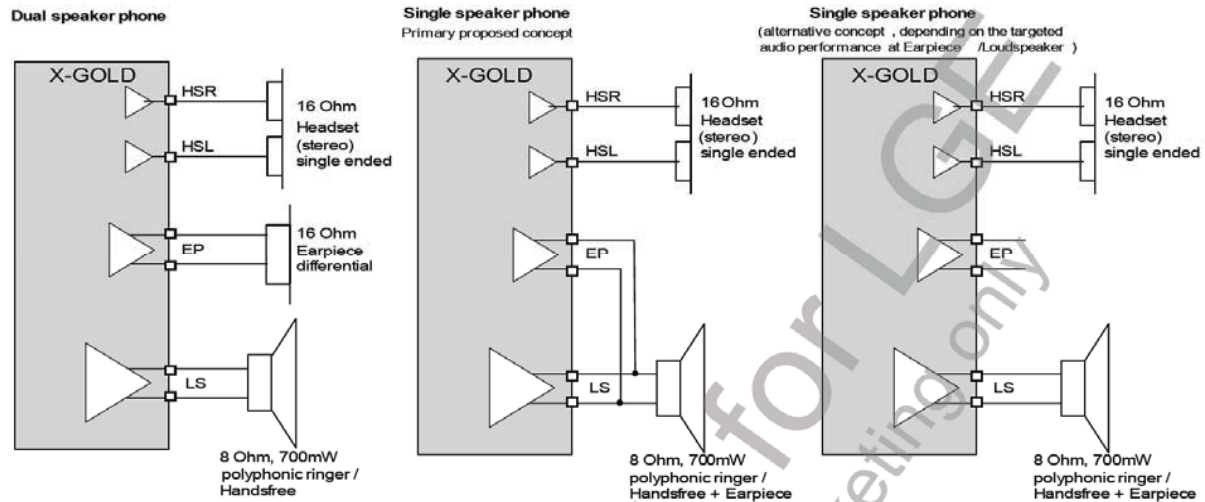


Figure 3.12.4 Different Application Scenarios

In order to achieve the single-speaker concept by parallel connection of Earpiece and Headset amplifier the Earpiece amplifier have to sustain the up to 5 V voltage of the class-D amplifier.

▪ Audio-in Path

The audio-in path of X-GOLD™215 provides two differential microphone input sources, MIC1 and MIC2.

- The inputs for microphone MIC1 are MICP1 and MICN1.
- The inputs for microphone MIC2 are MICP2 and MICN2.

The audio-in path consists of an input selector, a low noise amplifier and following pre-filter with gain control, a second order $\Sigma\Delta$ -converter and a digital decimation filter. It supports both standard GSM (bandwidth 3.5 kHz) and wideband (bandwidth 7 kHz) speech bands.

The differential input signal from the microphone first passes a low noise amplifier and following pre-filter and an anti-aliasing pre-filtering stage achieving an overall variable gain ranging from 0 dB to +39 dB. The signal is then modulated by a second order $\Sigma\Delta$ -converter which is clocked with the same clock rate as the digital to analog converters. The $\Sigma\Delta$ -converter delivers a 1-bit pulse density modulated data stream at a rate of 2 MHz to the digital decimation filter which reduces the rate to 8 kHz or 16 kHz, depending on the current mode.

To improve SNR the sample frequency can be doubled in dedicated modes and the modulated data stream is 4MHz instead of 2 MHz.

▪ Microphone Supply

X-GOLD™215 has a single ended power-supply concept for electret microphones:

For both modes a minimal load capacitance of t.b.d. nF is necessary to guarantee stable operation of the buffer.

The maximal load capacitance must not exceed t.b.d. nF.

2 microphone supplies VMIC and VUMIC are available. The supply VUMIC has a ultra-low-power mode, where the current consumption is minimum, whilst at the same time the noise performance is reduced.

For this purpose the VUMIC is directly supplied out of the VMIC regulator, the Mic-Buffer can be switched off and only the quiescent current of the VMIC regulator is present. This mode can be used to supply a headset and allow accessory detection with highly reduced current consumption For normal operation the supply can be switched to normal operation mode with improved noise performance. In case of an digital microphone VMIC can be used for supplying this microphone.

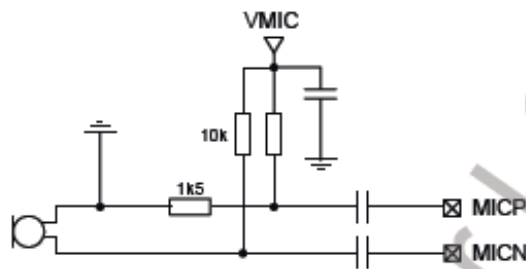


Figure 3.12.5 Typical Microphone Supply Generation (alternative)

3.13 Camera Interface(2M Fixed Focus Camera)

3.13.1 PMB8815 Camera Interface

The Camera Interface (CIF) represents a complete video and still picture input interface (see Figure 3.13.1).

The CIF contains image processing, scaling, and compression functions. The integrated image processing unit supports image sensors with integrated $YCbCr$ processing.

Scaling is used for downsizing the sensor data for either displaying them on the LCD, or for generating data streams for MPEG-4 compression. In general, $YCbCr$ 4:2:2 JPEG compressed images should use the full sensor resolution, but they can also be downscaled to a lower resolution for smaller JPEG files. Scaling also can be used for digital zoom effects, because the scalers are capable of up-scaling as well.

CIF

All data is transmitted via the memory interface to an AHB bus system using a bus master interface.

Programming is done by register read/write transactions using an AHB slave interface.

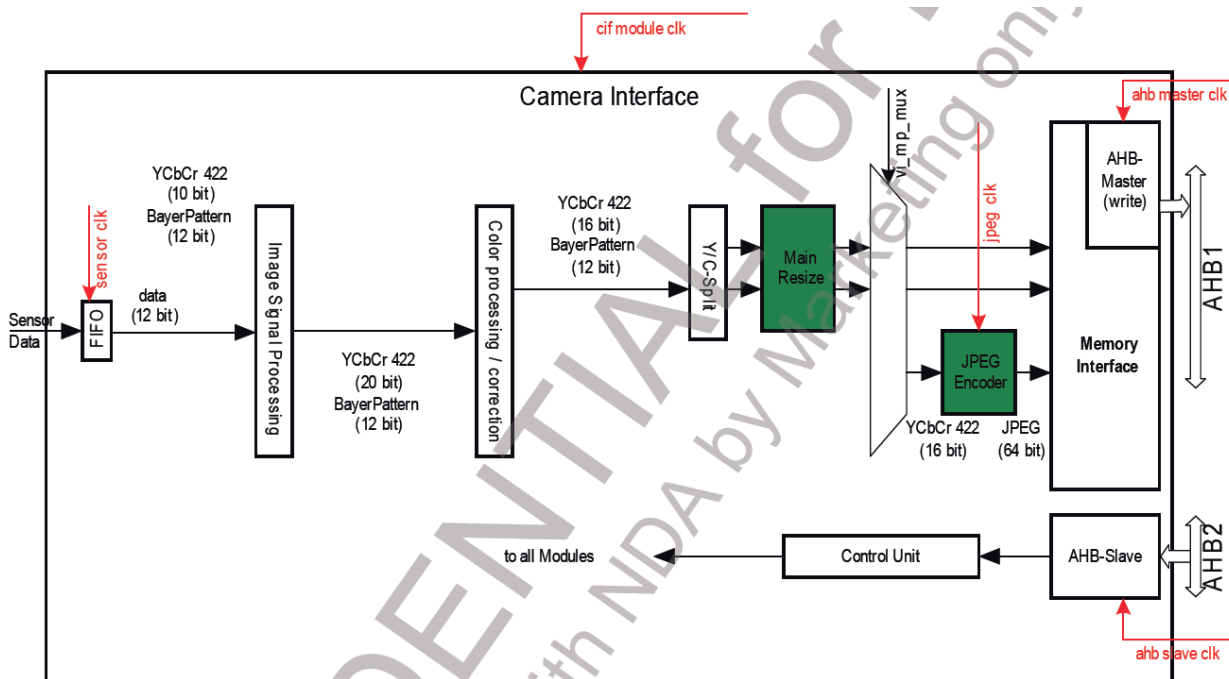


Figure 3.13.1 Block Diagram of Camera Interface

Functional Overview of CIF

The following list gives an overview over the CIF's functionality:

- 78 MHz system clock
- 78 MHz sensor clock
- 78 MHz JPEG encoder clock
- 32-bit AHB slave programming interface
- ITU-R BT 601 compliant video interface supporting $YCbCr$
- ITU-R BT 656 compliant video interface supporting $YCbCr$ data
- 8-bit camera interface
- 12-bit resolution per color component internally
- $YCbCr$ 4:2:2 processing
- Hardware JPEG encoder incl. JFIF1.02 stream generator and programmable quantization and Huffman tables
- Windowing and frame synchronization
- Continuous resize support
- Frame skip support for video (e.g. MPEG-4) encoding
- Macro block line, frame end, capture error, data loss interrupts and sync. (h_start, v_start) interrupts
- Programmable polarity for synchronization signals
- Luminance/chrominance and chrominance blue/red swapping for YUV input signals
- Maximum input resolution of 3 Mpixels (2048x1536 pixels)
- Main scaler with pixel-accurate up- and down-scaling to any resolution between 3 MP (2048x1536) and 32x16
- pixel in processing mode
- Buffer in system memory organized as ring-buffer
- Buffer overflow protection for raw data and JPEG files
- Asynchronous reset input, software reset for the entire IP and separate software resets for all sub-modules
- Interconnect test support
- Semi planar storage format
- Color processing (contrast, saturation, brightness, hue)
- Power management by software controlled clock disabling of currently not needed sub-modules

3.14 KEY BACKLIGHT LED Interface

Key Backlight LED is controlled by RT9396 (U301). If LED_PWM is high, Current is flowing from VBAT to LED. Then Light emitted from The LED.

LED_PWM is operating PWM. It is reducing current consumption.

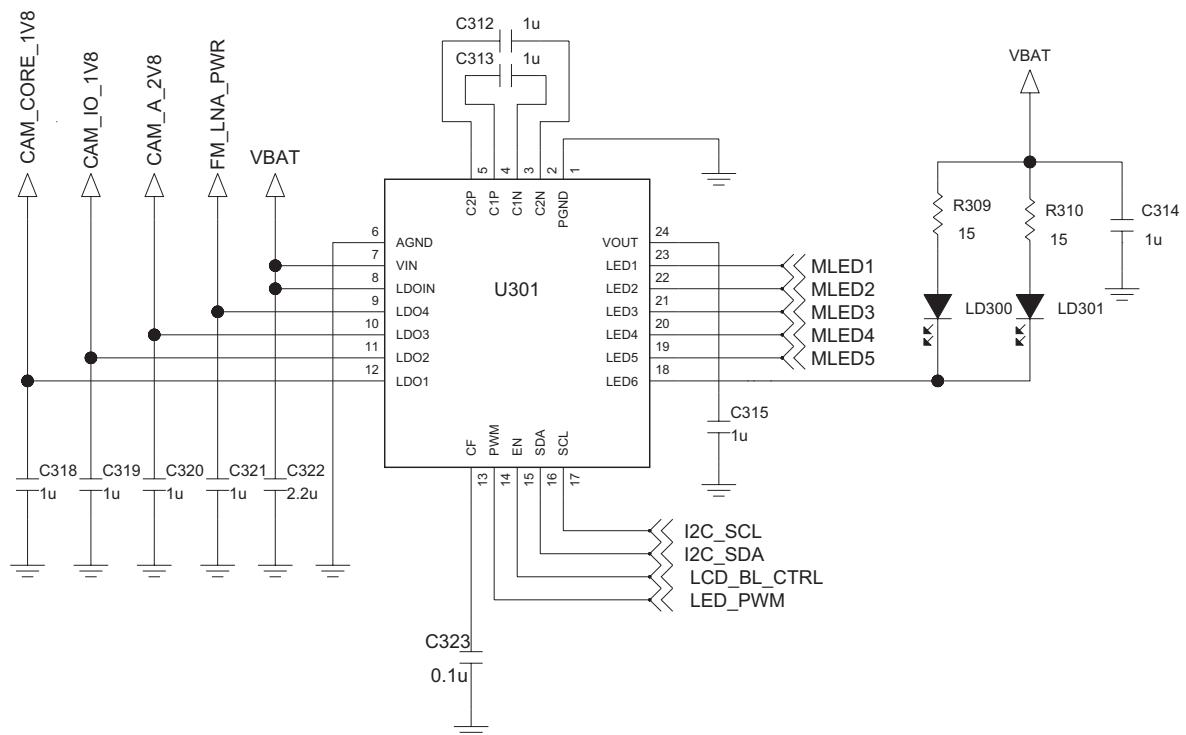


Figure 3-14-1 Key Backlight Block

3.15 Vibrator Interface

Support PWM signal which generated by hardware itself via register control

Direct connect to the VIB_P pin from PMB8815 without any external component required

It is capable to driver the vibrator motor up to 150mA

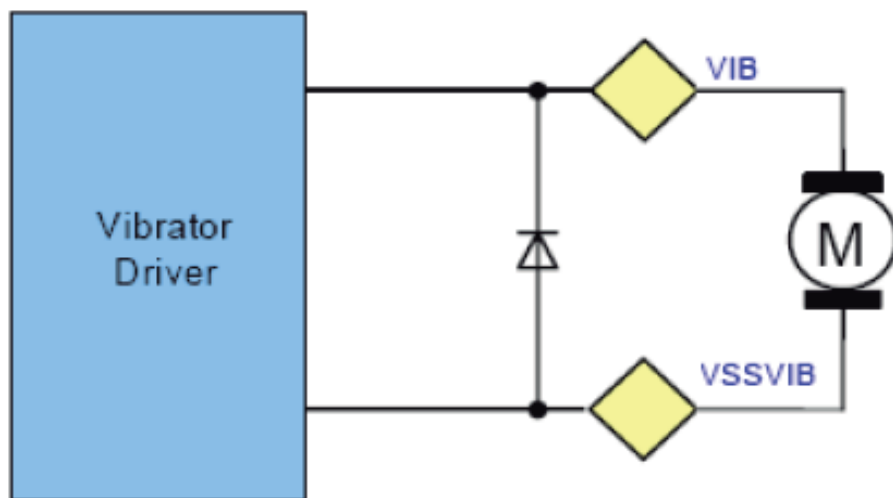


Figure 3-15-1 Vibrator Driver Block Diagram

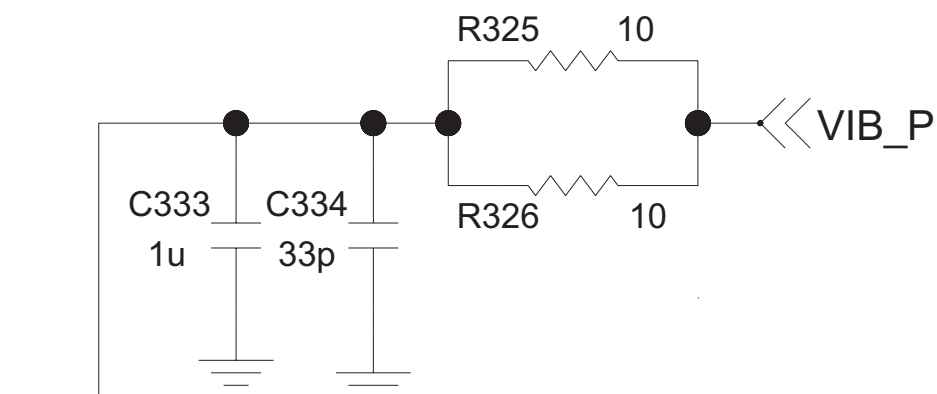


Figure 3-15-2 Vibrator Driver Block

4. TROUBLE SHOOTING

4.1 RF Component

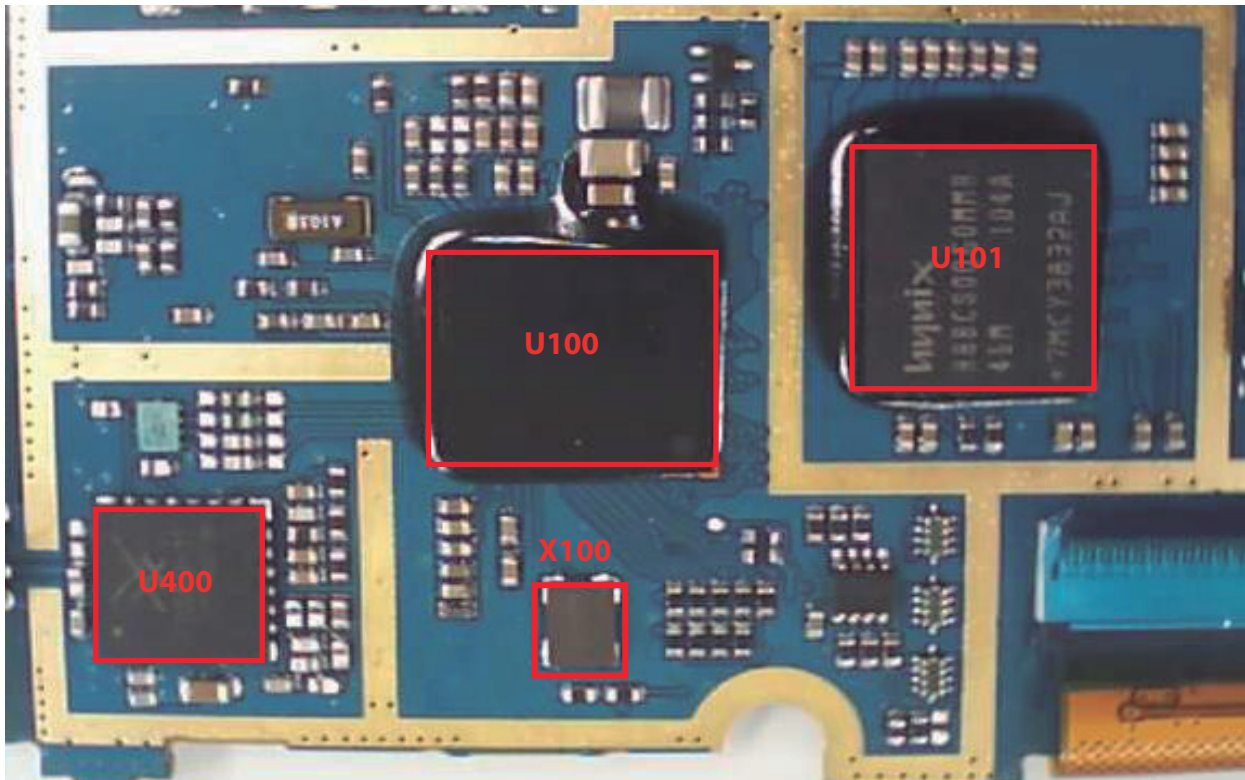
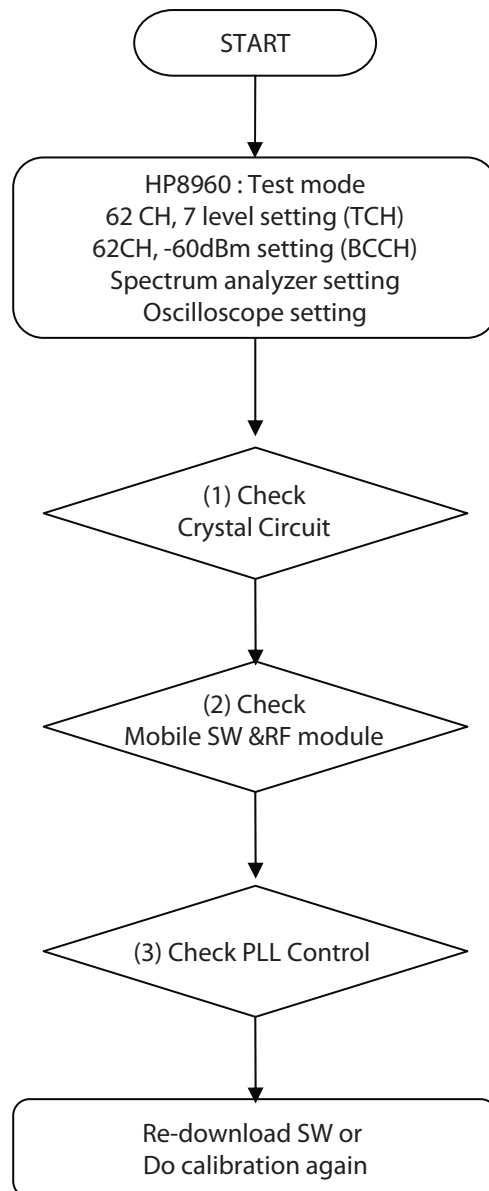


Figure 4.1

U100(PMB8815)	Main Chip (IFX_XMM215x_NAND)
U101	Memory (1G/512DDR)
U400	RF Module (SKY77550)
X100	Crystal, 26MHz Clock

4.2 RX Trouble

CHECKING FLOW



(1) Checking Crystal Circuit

TEST POINT

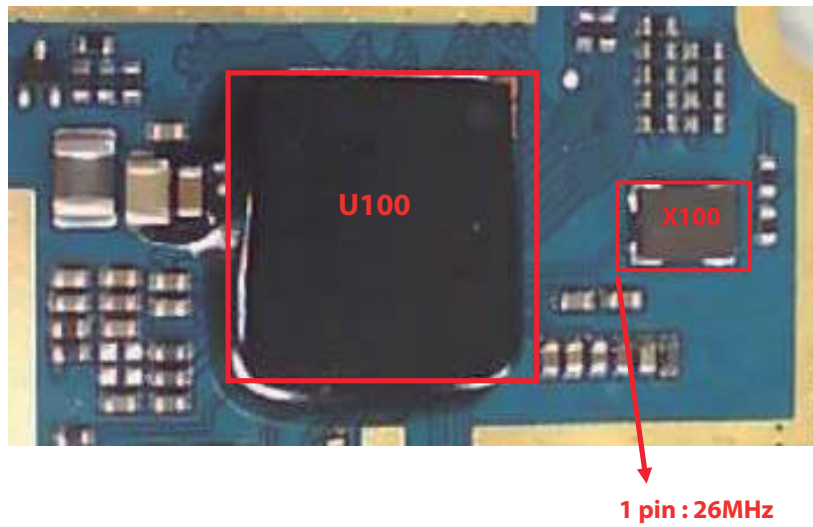
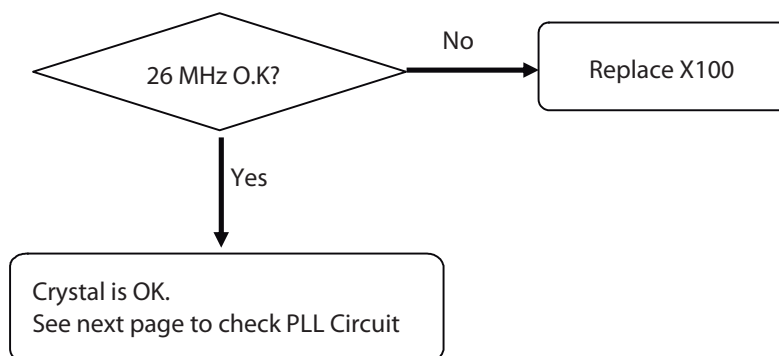


Figure 4.2.1

CHECKING FLOW



4. TROUBLE SHOOTING

CIRCUIT

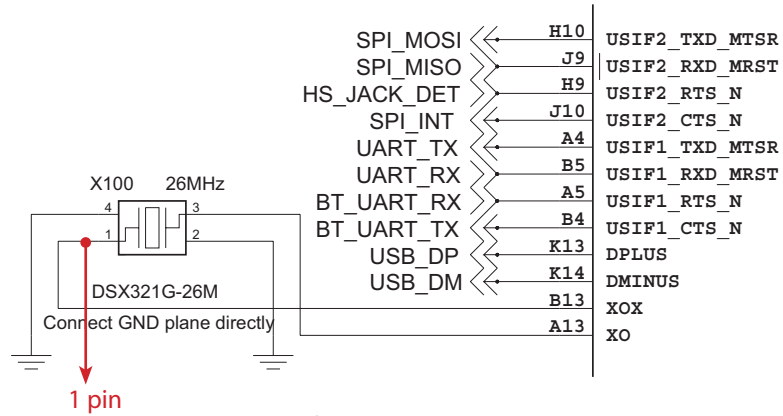


Figure 4.2.2

WAVEFORM

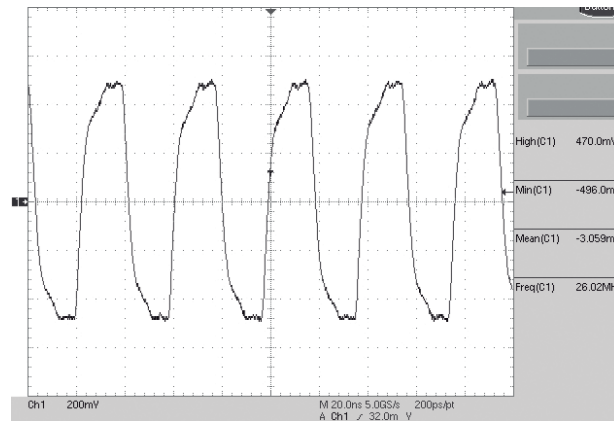


Figure 4.2.3

(2) Checking Mobile SW & FEM

TEST POINT

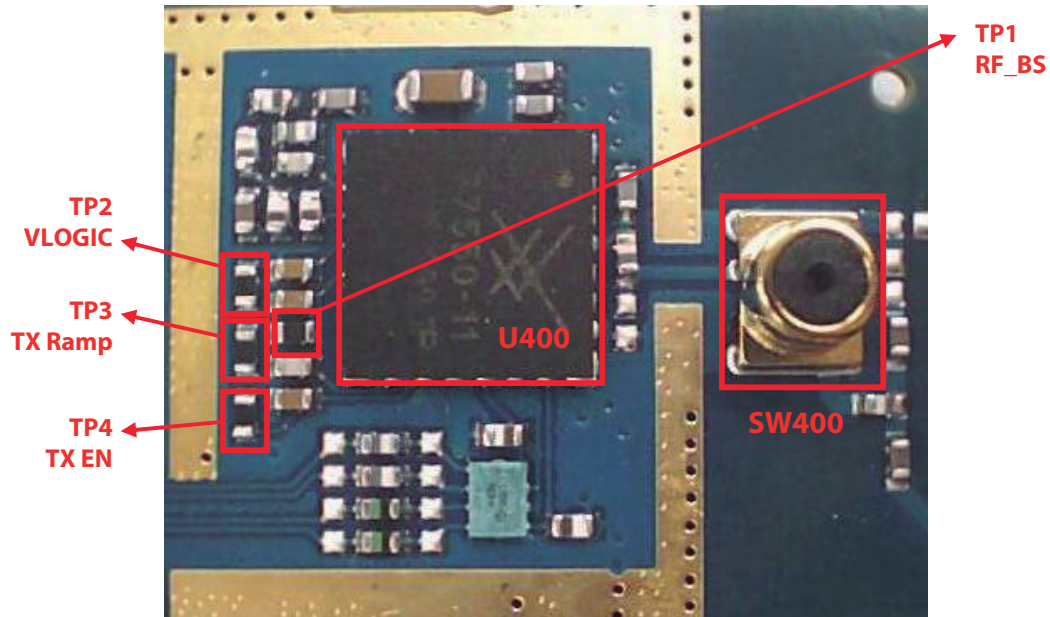
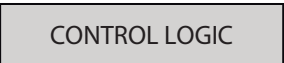


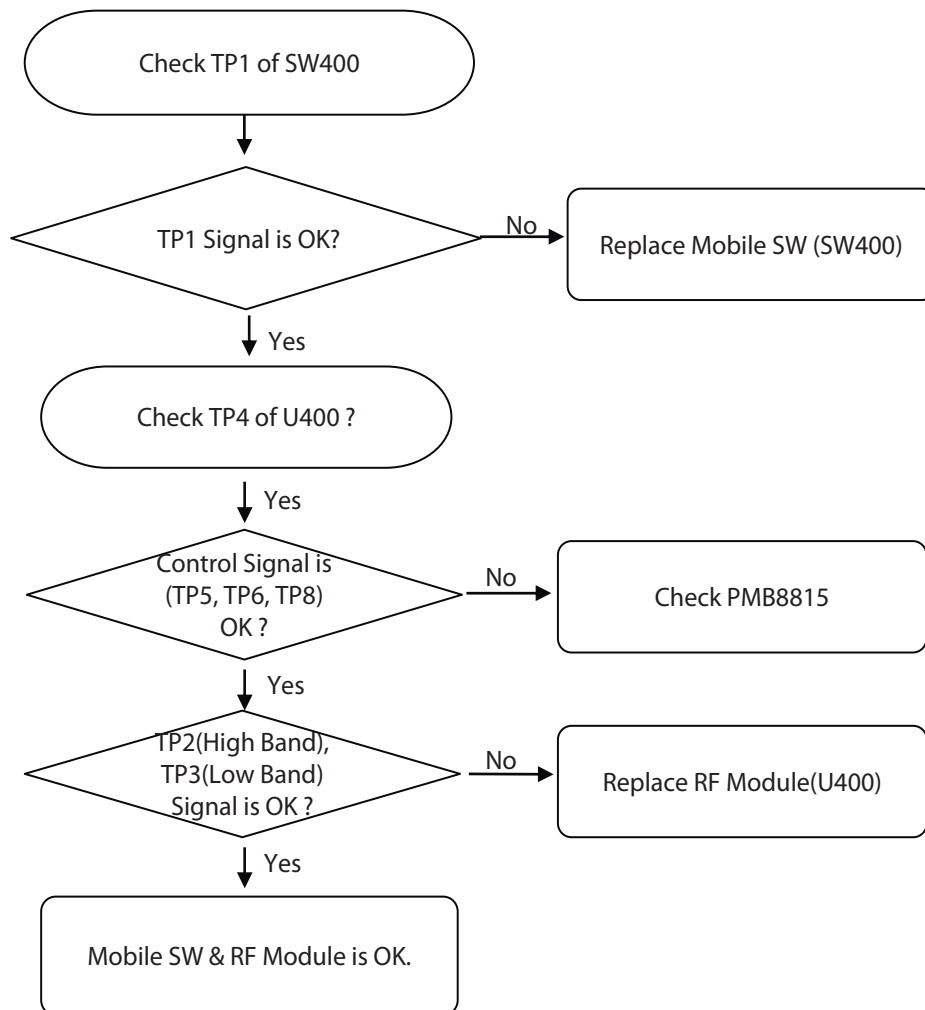
Figure 4.2.4

CIRCUIT

MODE	VSW_EN	TxEN	BS
STANDBY	0	0	0
RX1	1	0	0
RX2	1	0	1
Tx_LB	1	1	0
Tx_HB	1	1	1



CHECKING FLOW

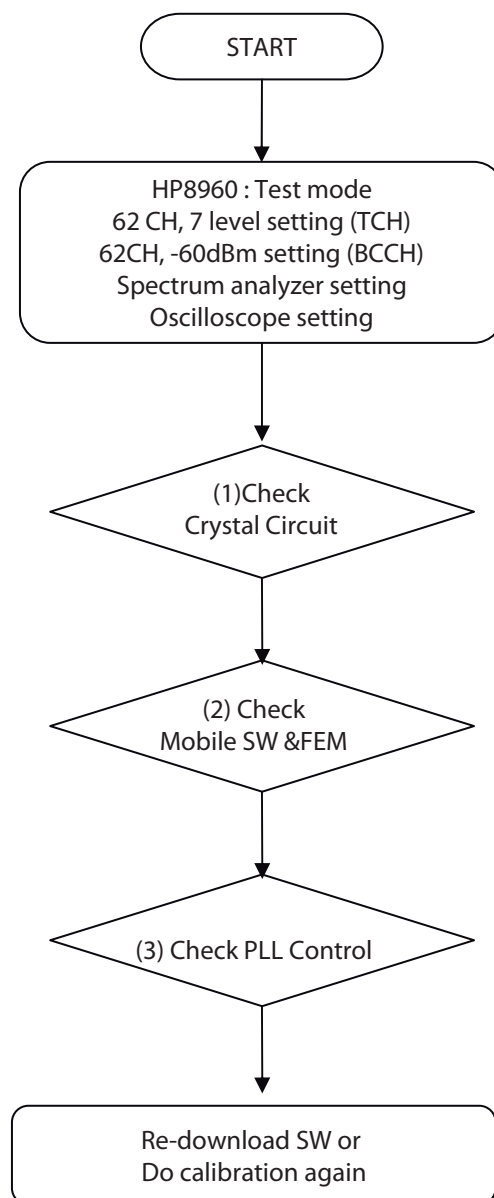


Mode	Input Control Bits		
	VSW_EN	TxEN	BS
STANDBY	0	0	0
Rx1 ¹	1	0	0
Rx2 ¹	1	0	1
Tx_LB	1	1	0
Tx_HB	1	1	1

¹ Rx1 and Rx2 are broadband receive ports and each supports the GSM850, GSM900, DCS, and PCS bands.

4.3 TX Trouble

CHECKING FLOW



(1) Checking Crystal Circuit

TEST POINT

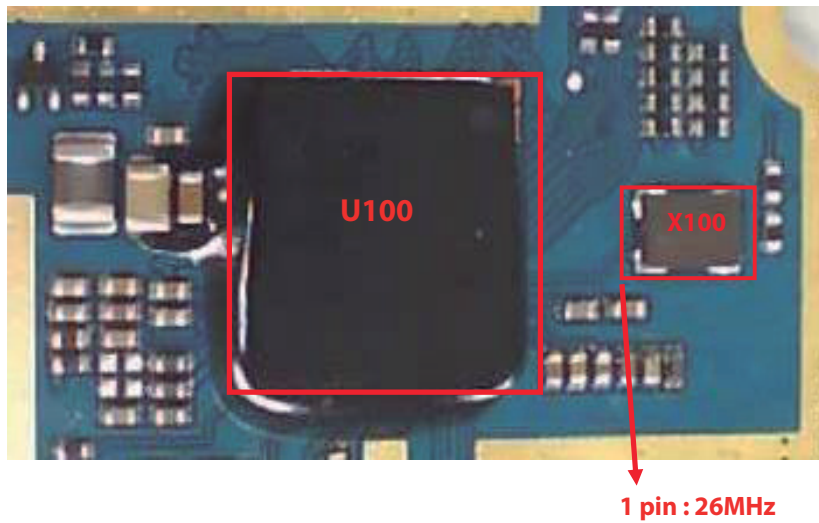
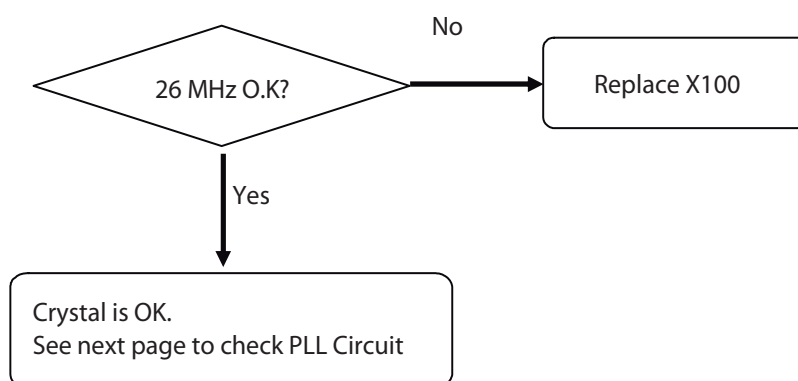


Figure 4.3.1

CHECKING FLOW



4. TROUBLE SHOOTING

CIRCUIT

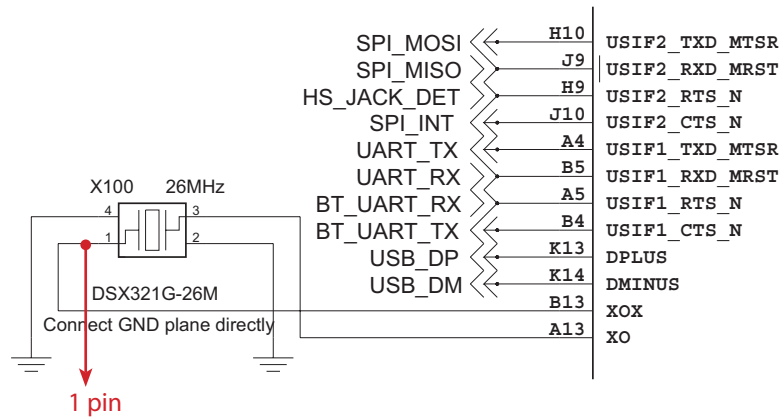


Figure 4.3.2

WAVEFORM

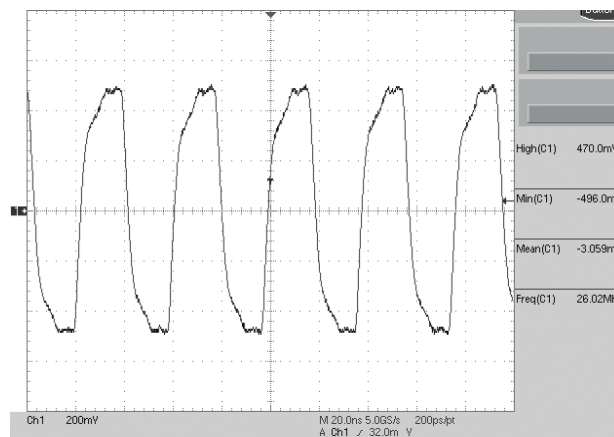


Figure 4.3.3

(2) Checking Mobile SW & TX Module

TEST POINT

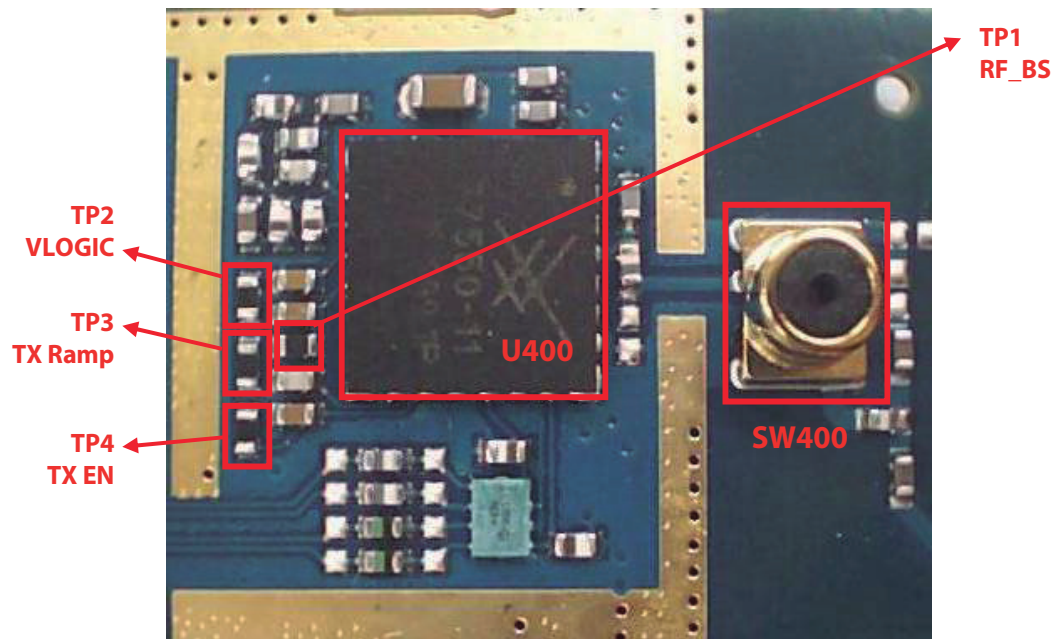
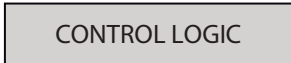


Figure 4.3.4

CIRCUIT

MODE	VSW_EN	TxEN	BS
STANDBY	0	0	0
RX1	1	0	0
RX2	1	0	1
Tx_LB	1	1	0
Tx_HB	1	1	1



File Edit Vertical HORIZ/Acq Trig Display Cursors Measure Math Utilities Help

Tek Stopped 2202 Acqs 20 Nov 08 18:35:42 Buttons

Curs1 Pos 4.62ms

Curs2 Pos 2.82ms

T1: 4.62ms
T2: 2.82ms
 Δt : -1.8ms
1/ Δt : -555.6Hz

TP8 (VLOGIC)

TP9 (Tx_EN)

TP5 (RF_BS)

EC

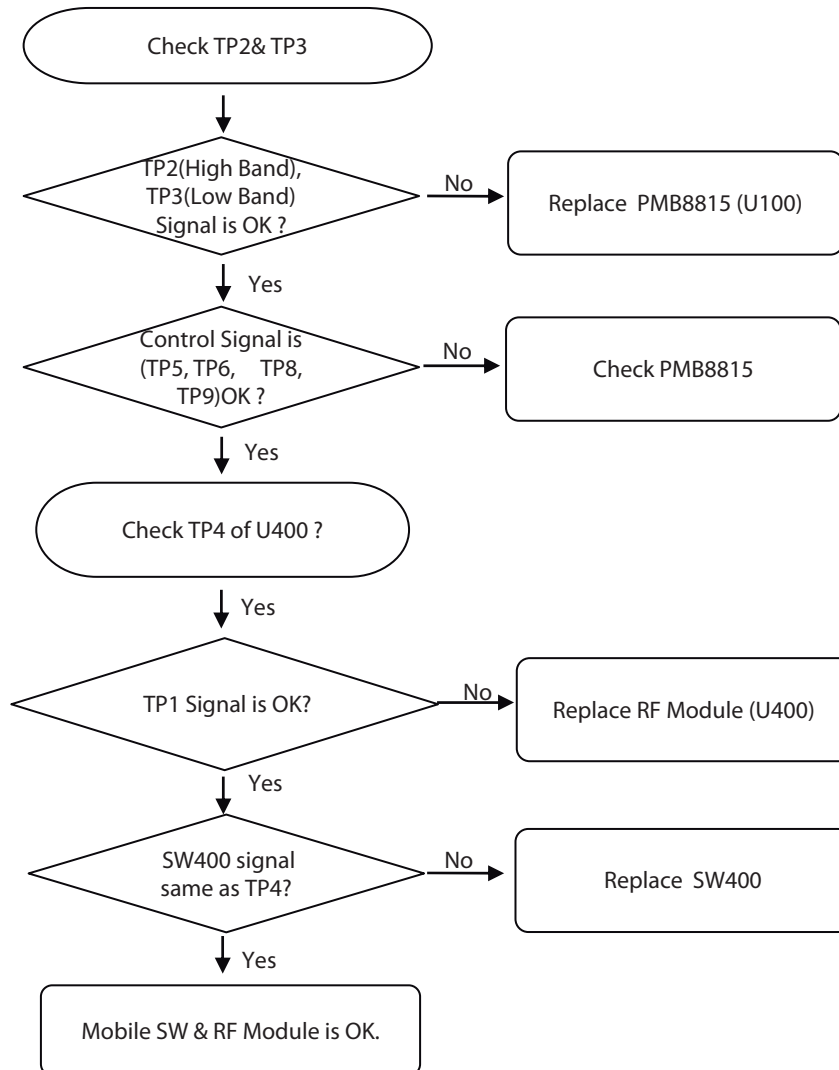
Freq(C1)	595.2Hz	Max(C1)	2.48V
Pk-Pk(C1)	2.56V	High(C1)	2.39V
Amp(C1)	2.4V	RMS(C1)	1.508V
High(C2)	2.33V	Max(C2)	2.48V

Ch1 1.0V 1.0V Ch2 1.0V 1.0V

M 1.0ms 50.0KS/s 20.0us/div

A Ch1 1.28 V

CHECKING FLOW



Low Band(850/900) Tx

Mode	Input Control Bits		
	VSW_EN	TxEN	BS
STANDBY	0	0	0
Rx1 ¹	1	0	0
Rx2 ¹	1	0	1
Tx_LB	1	1	0
Tx_HB	1	1	1

¹ Rx1 and Rx2 are broadband receive ports and each supports the GSM850, GSM900, DCS, and PCS bands.

4.4 Power On Trouble

TEST POINT

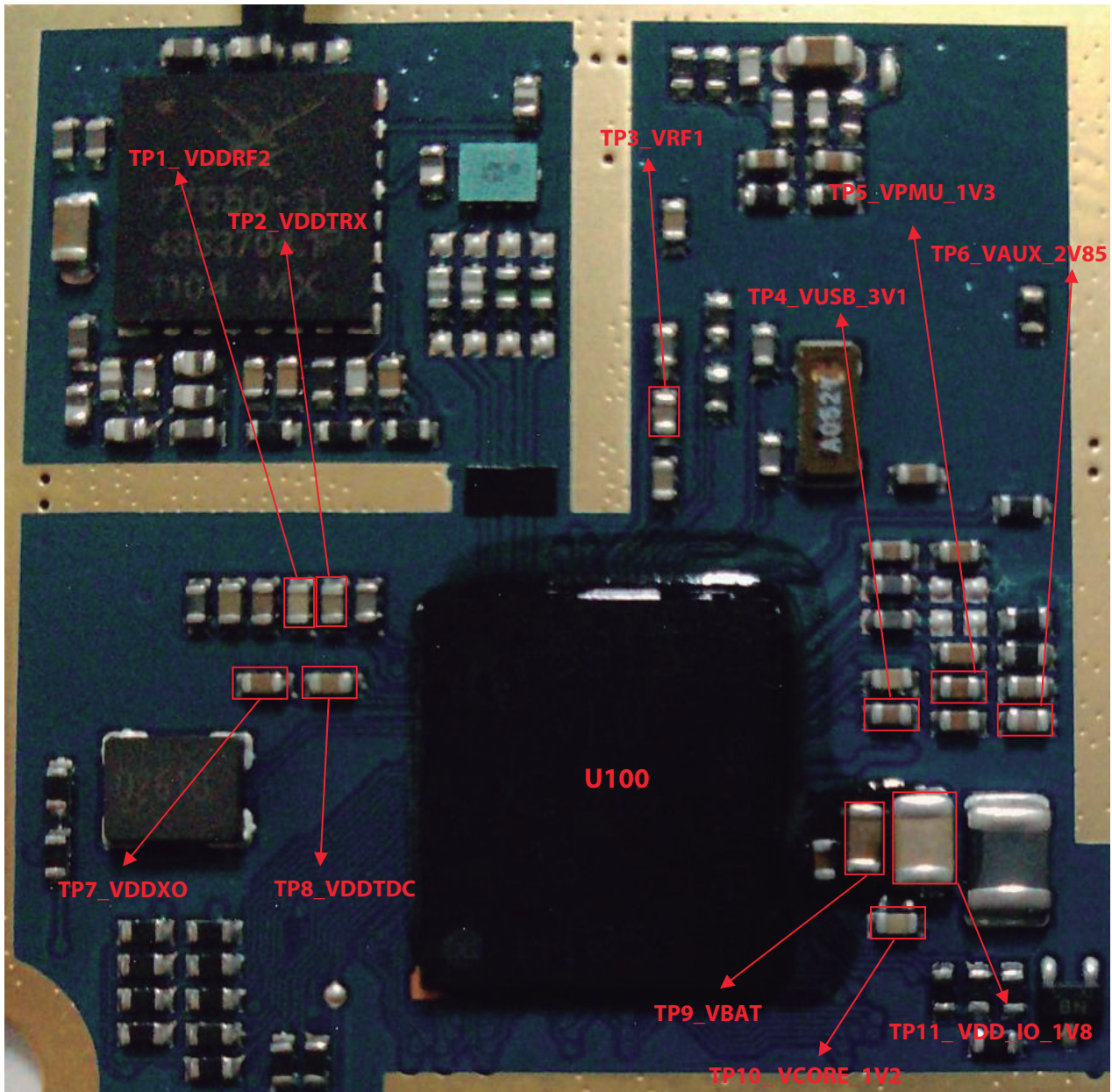
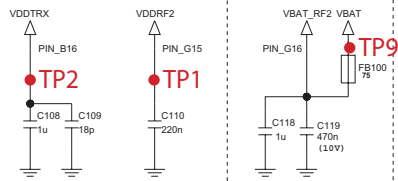


Figure 4.4

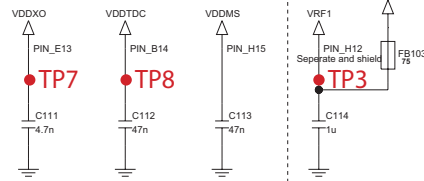
4. TROUBLE SHOOTING

CIRCUIT

RF SUPPLIES (CLEAN GND)



RF SUPPLIES (DIRTY GND)



DBB SUPPLIES

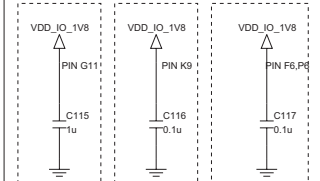
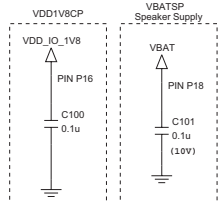
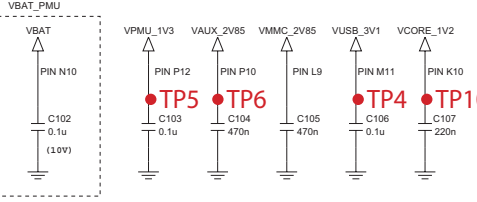


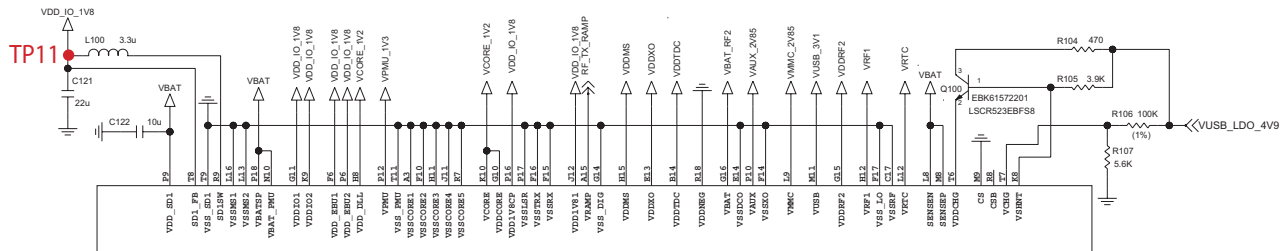
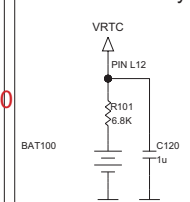
ABB SUPPLIES



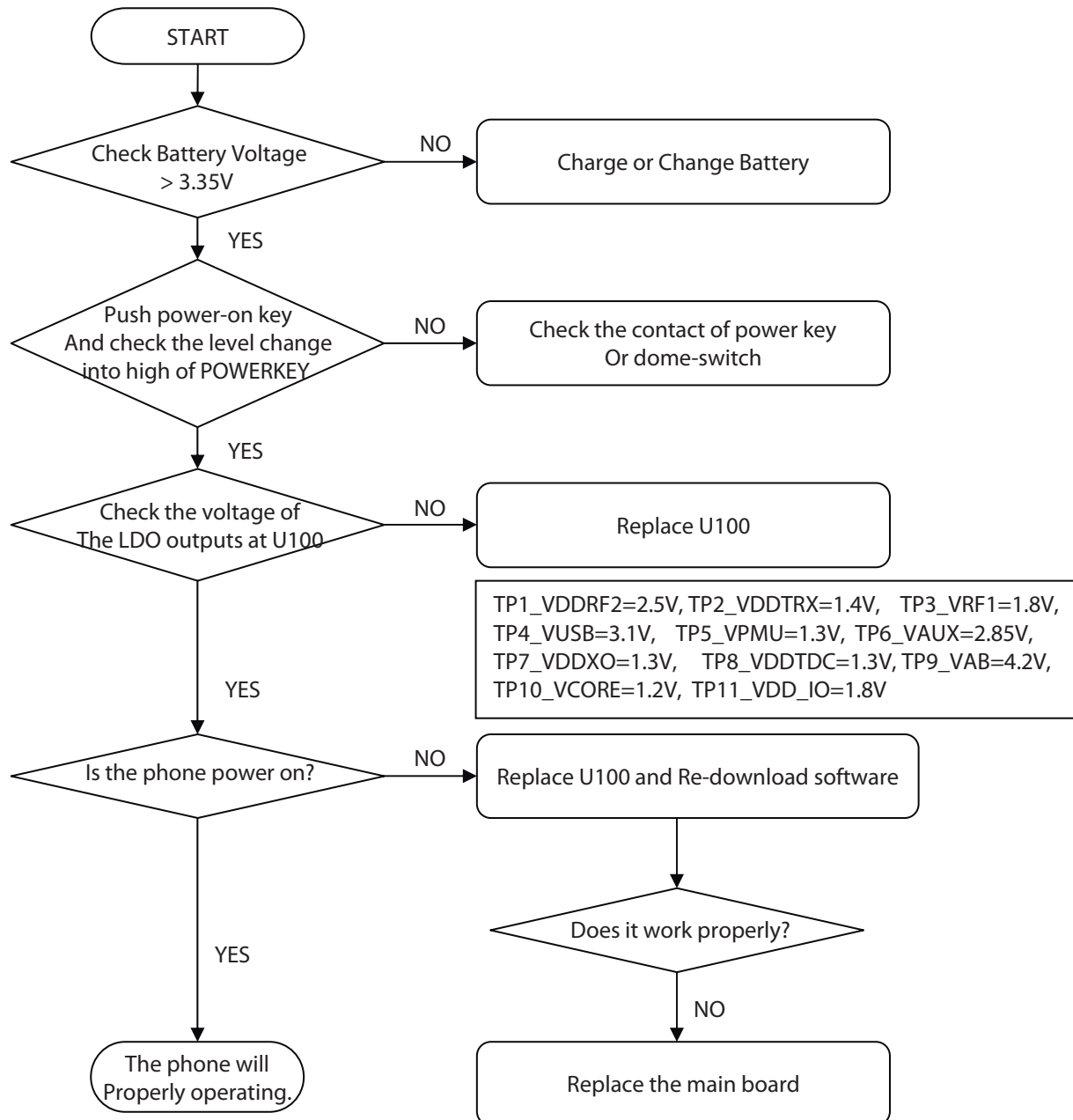
PMU SUPPLIES



BACK UP Battery



CHECKING FLOW



4.5 Charging Trouble

TEST POINT

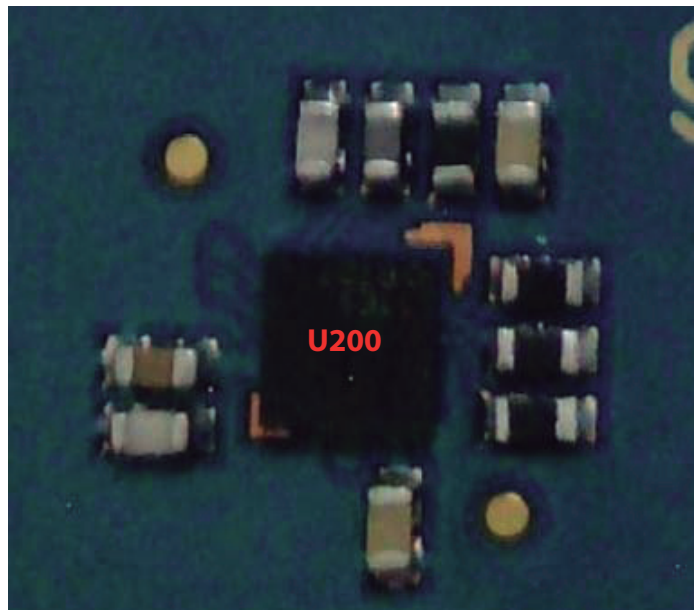


Figure 4.5

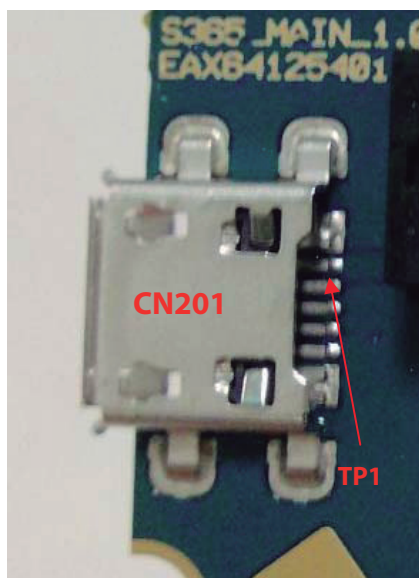


Figure 4.5.1

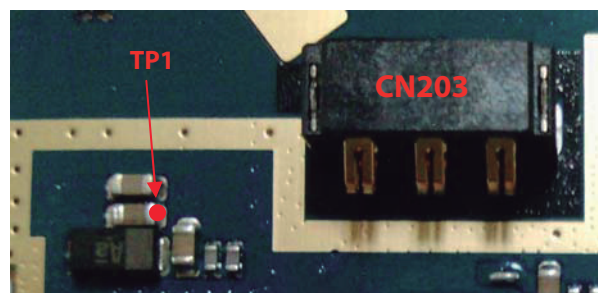
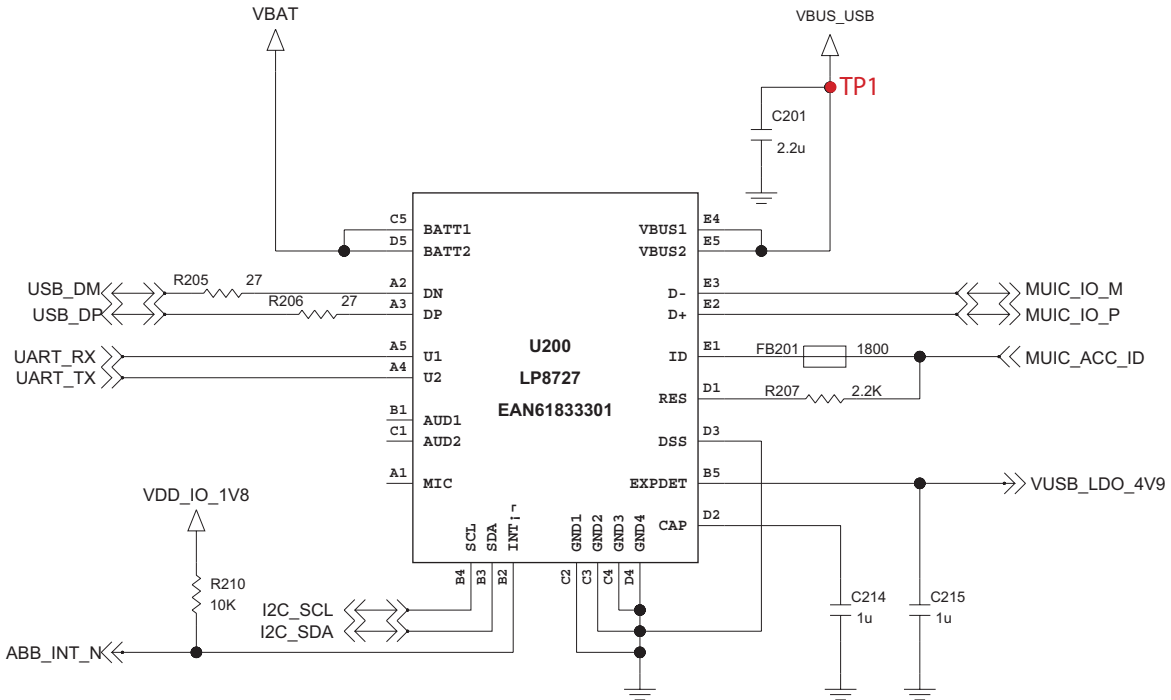
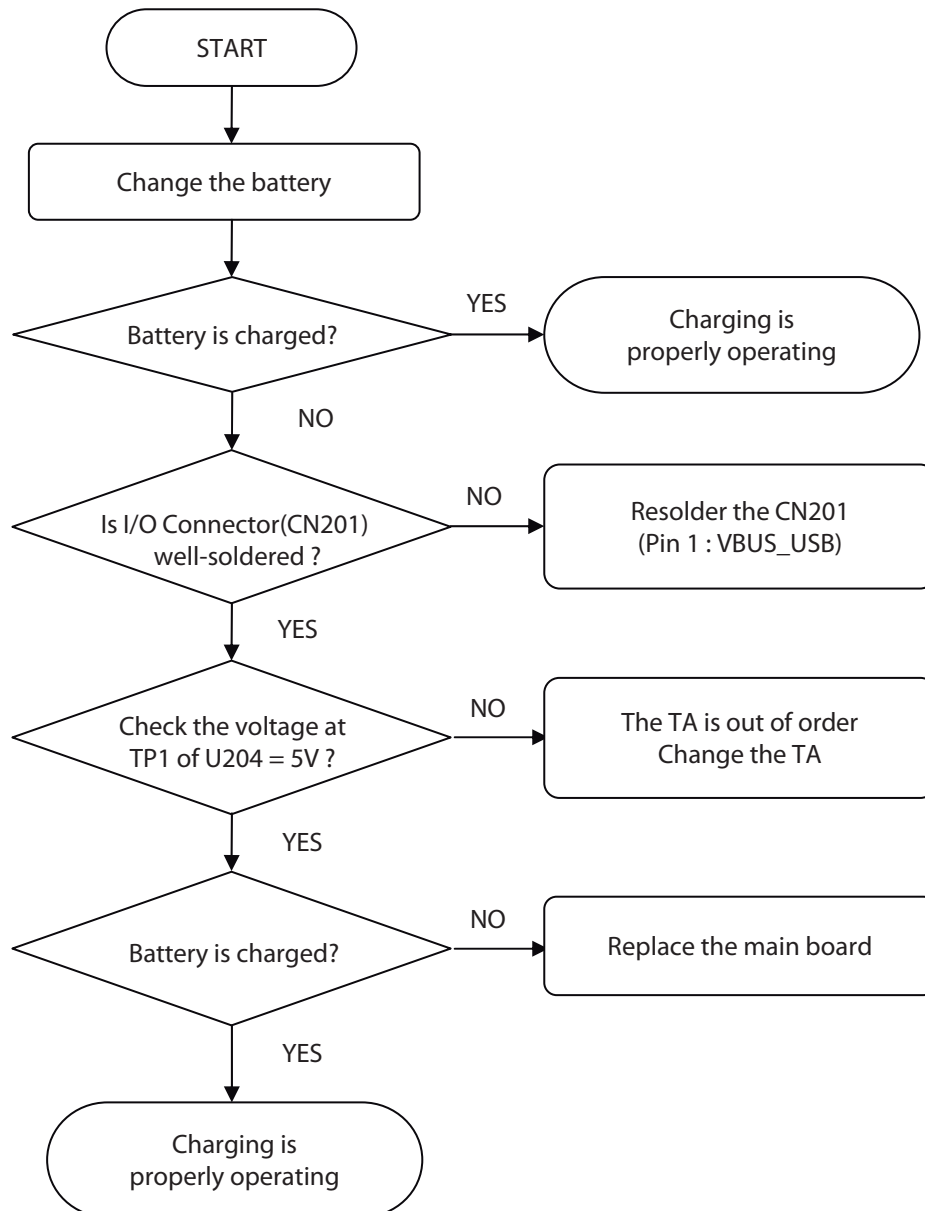


Figure 4.5.2

CIRCUIT



CHECKING FLOW



4.6 Vibrator Trouble

TEST POINT

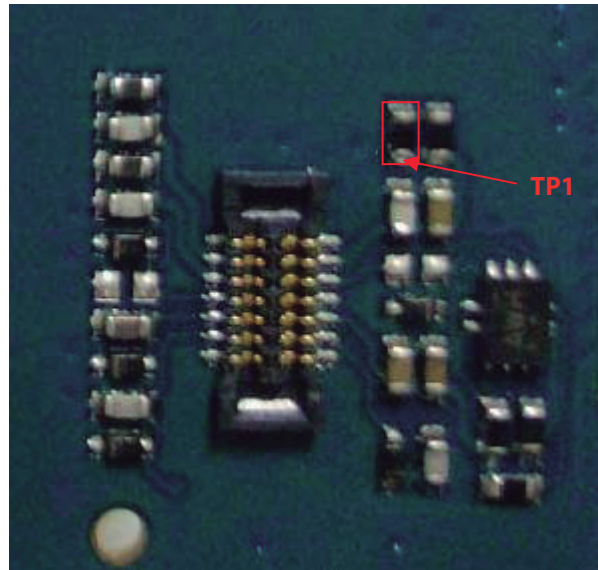


Figure 4.6

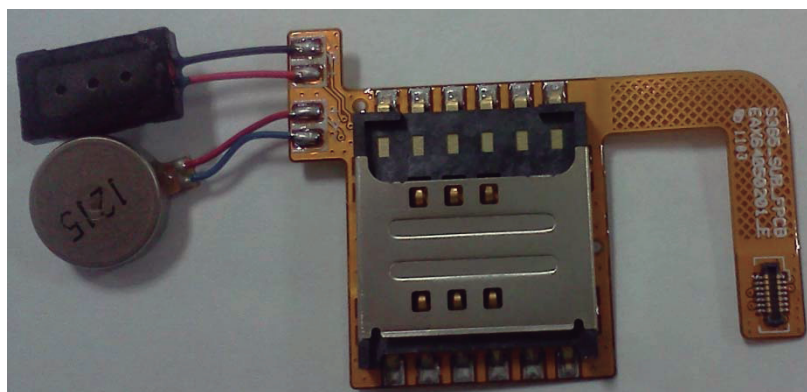
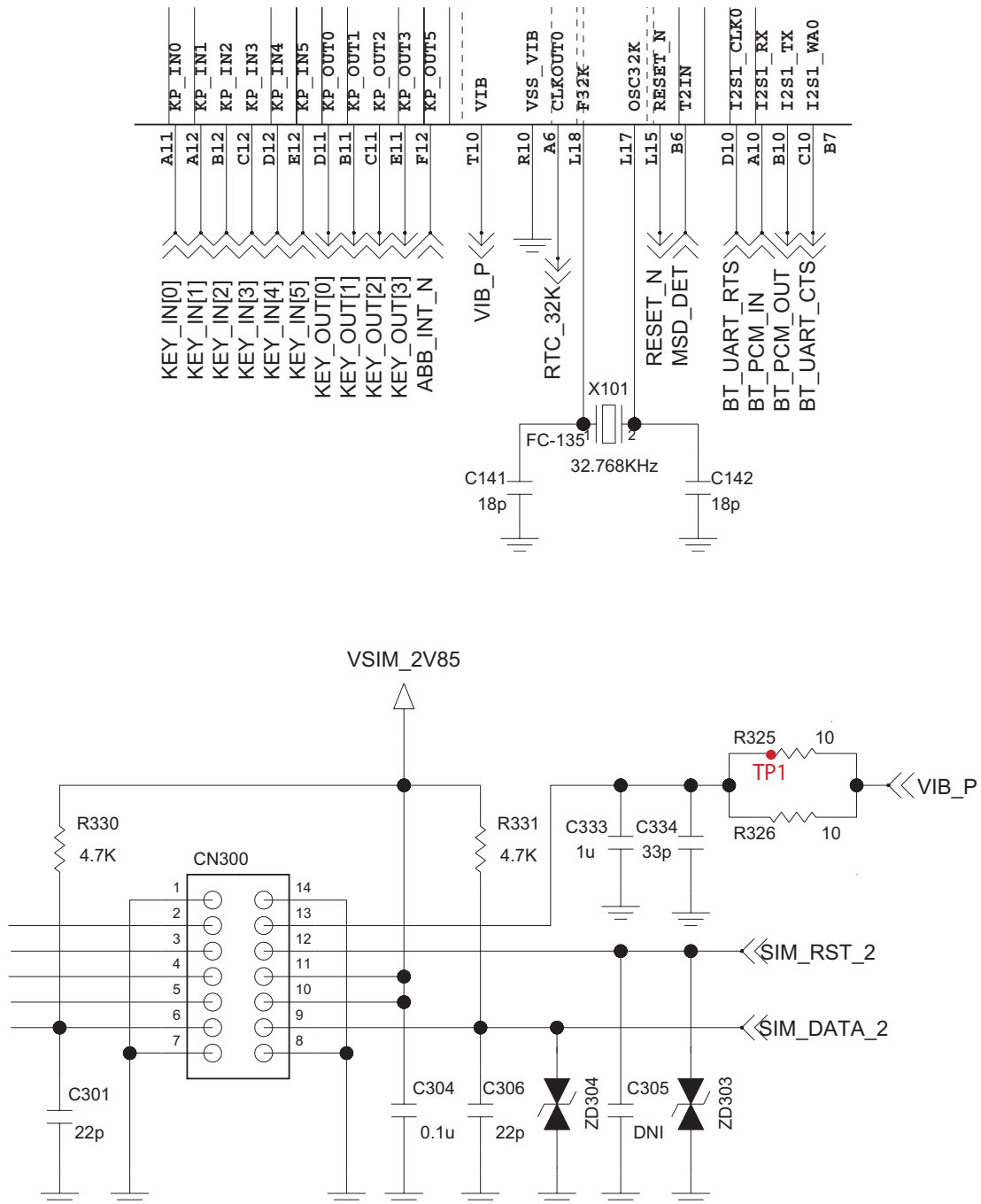


Figure 4.6.1

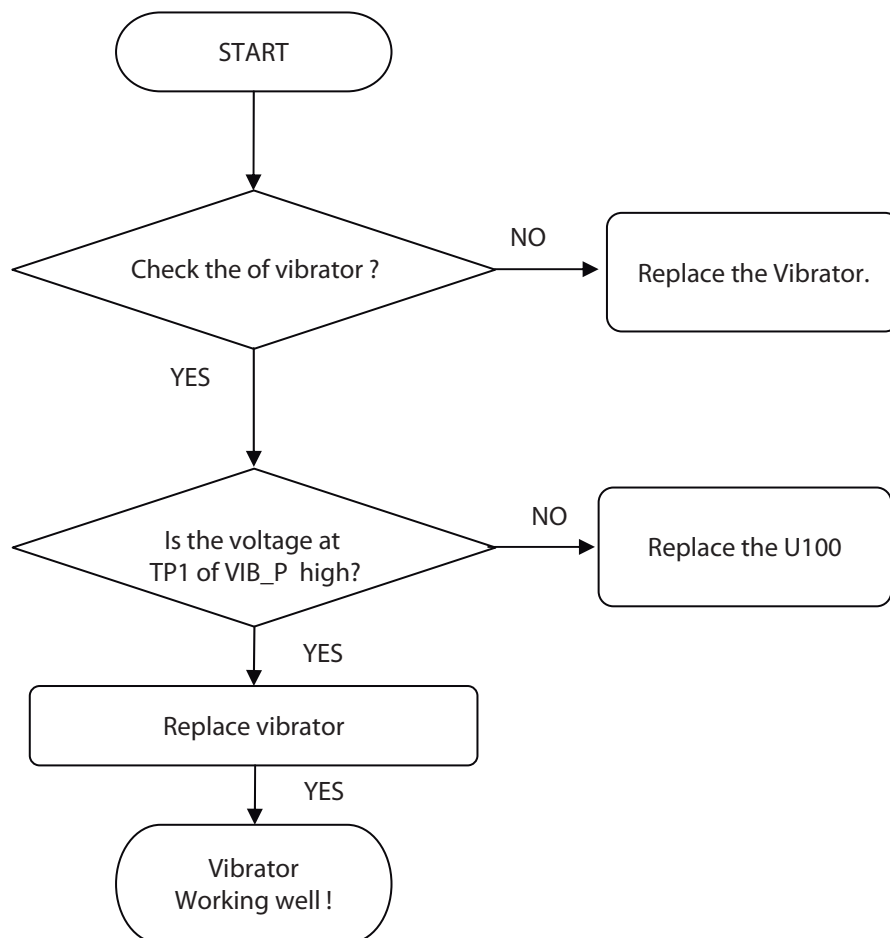
CIRCUIT



4. TROUBLE SHOOTING

CHECKING FLOW

SETTING : Enter the engineering mode, and set vibrator on at vibration of BB test menu



4.7 LCD Trouble

TEST POINT

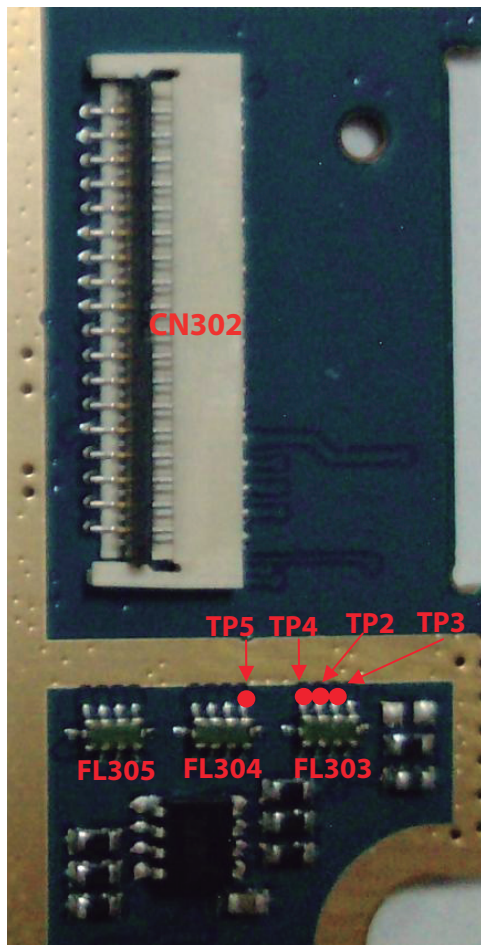


Figure 4.7

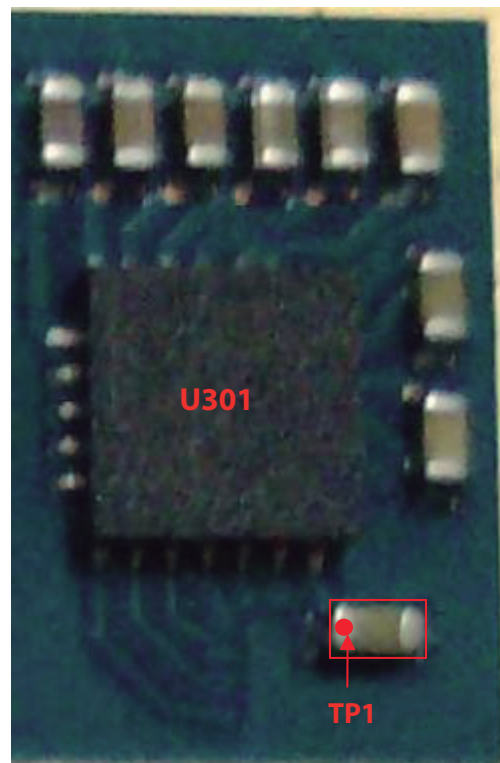
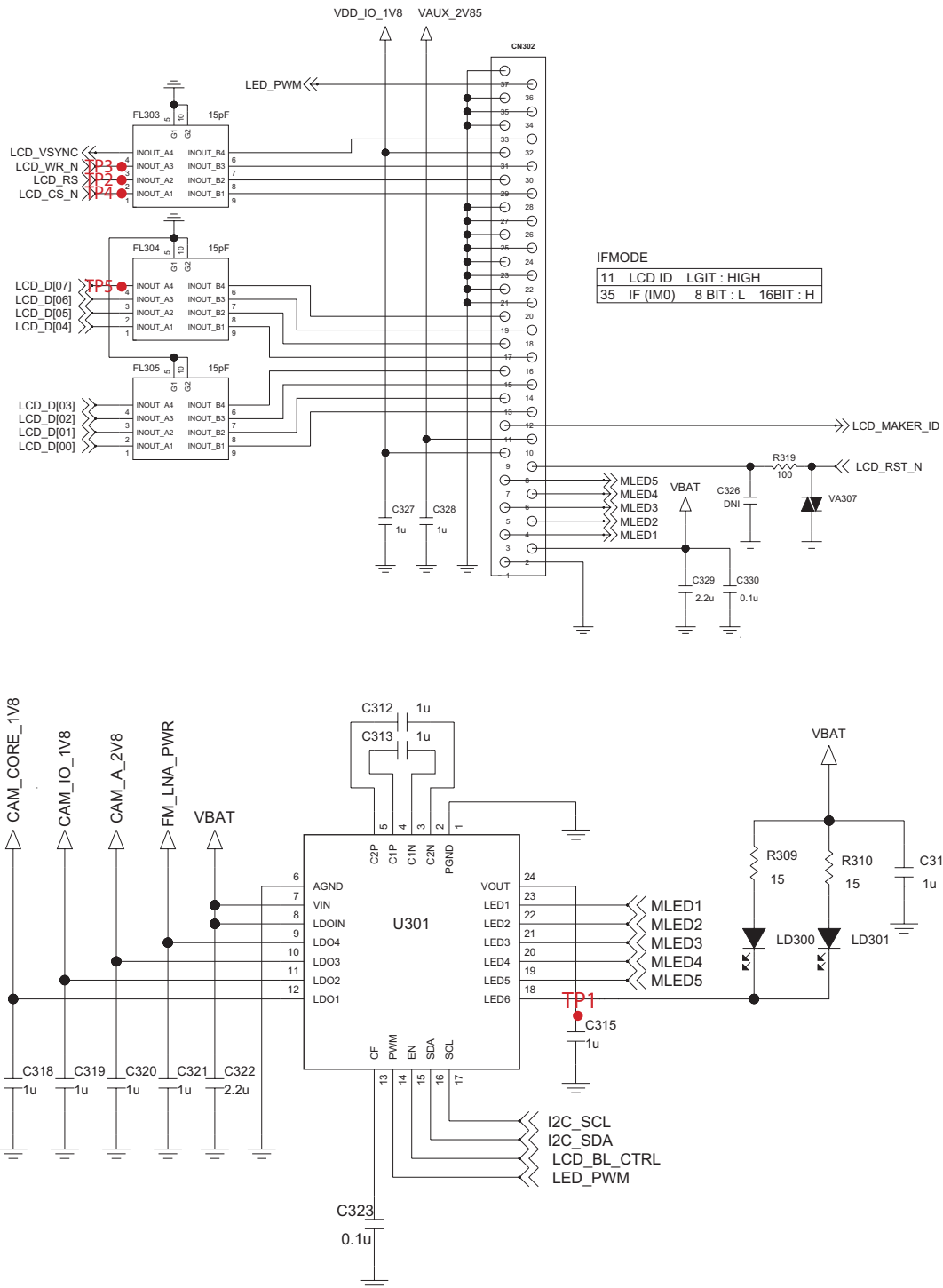


Figure 4.7.1

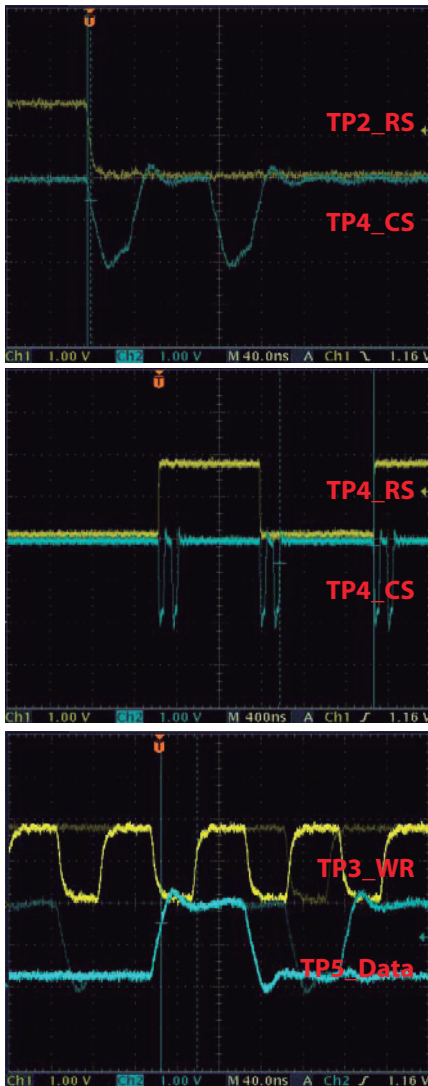
4. TROUBLE SHOOTING

CIRCUIT



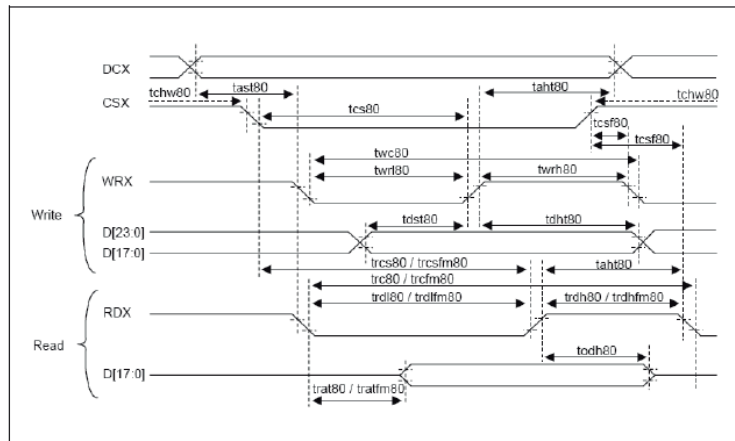
Waveform

Bus Interface Operation



14. Timing Characteristics

14.1. 80-System bus interface operation



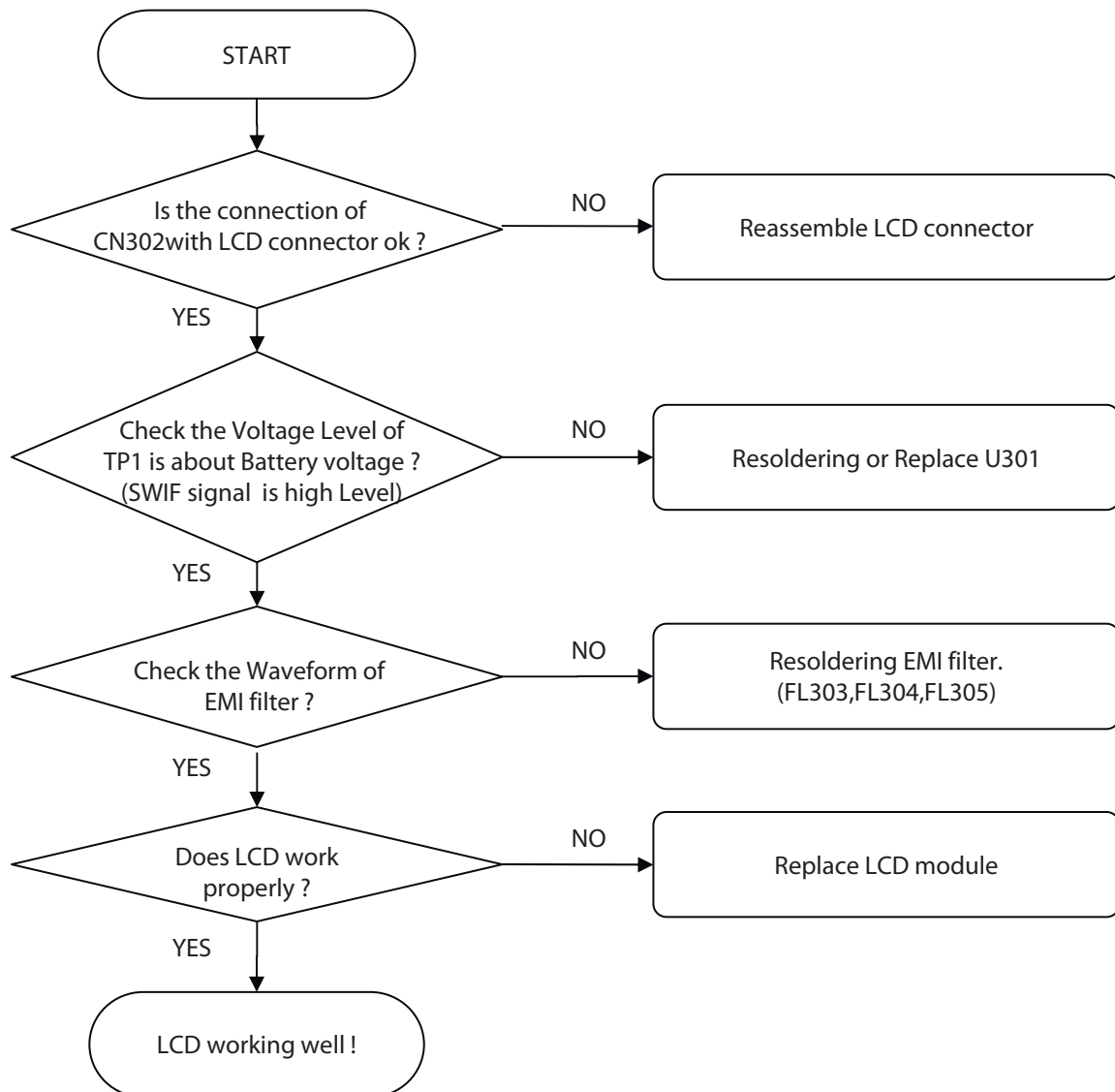
14.2. 80-System bus interface timing characteristics

(Condition : IOVCC = 1.65~3.3V, VCC = 2.4~3.3V, Ta=25℃)

Signal	Parameter	Symbol	Min	Max	Unit	Description
DCX	DCX setup time	tast80	0	—	ns	
	DCX hold time	taht80	10	—	ns	
CSX	CSX "H" pulse width	tchw80	0	—	ns	
	Chip select setup time(write)	tcs80	15	—	ns	
	Chip select setup time(Read ID)	trcs80	45	—	ns	
	Chip select setup time(Read FM)	trcsfm80	355	—	ns	
WRX	Chip select wait time(write/read)	tcsf80	10	—	ns	
	Write cycle	twc80	66	—	ns	
	Control pulse H duration	twrh80	15	—	ns	
	Control pulse L duration	twrl80	15	—	ns	
RDX(ID)	Read cycle	trc80	160	—	ns	When read ID data
	Control pulse H duration	trdh80	90	—	ns	
	Control pulse L duration	trdl80	45	—	ns	
RDX(FM)	Read cycle	trcfm80	450	—	ns	When read from frame memory
	Control pulse H duration	trdhfm80	90	—	ns	
	Control pulse L duration	trdlfm80	355	—	ns	

Graph 4.7.2. LCD Data Waveform

CHECKING FLOW



4.8 Camera Trouble

TEST POINT

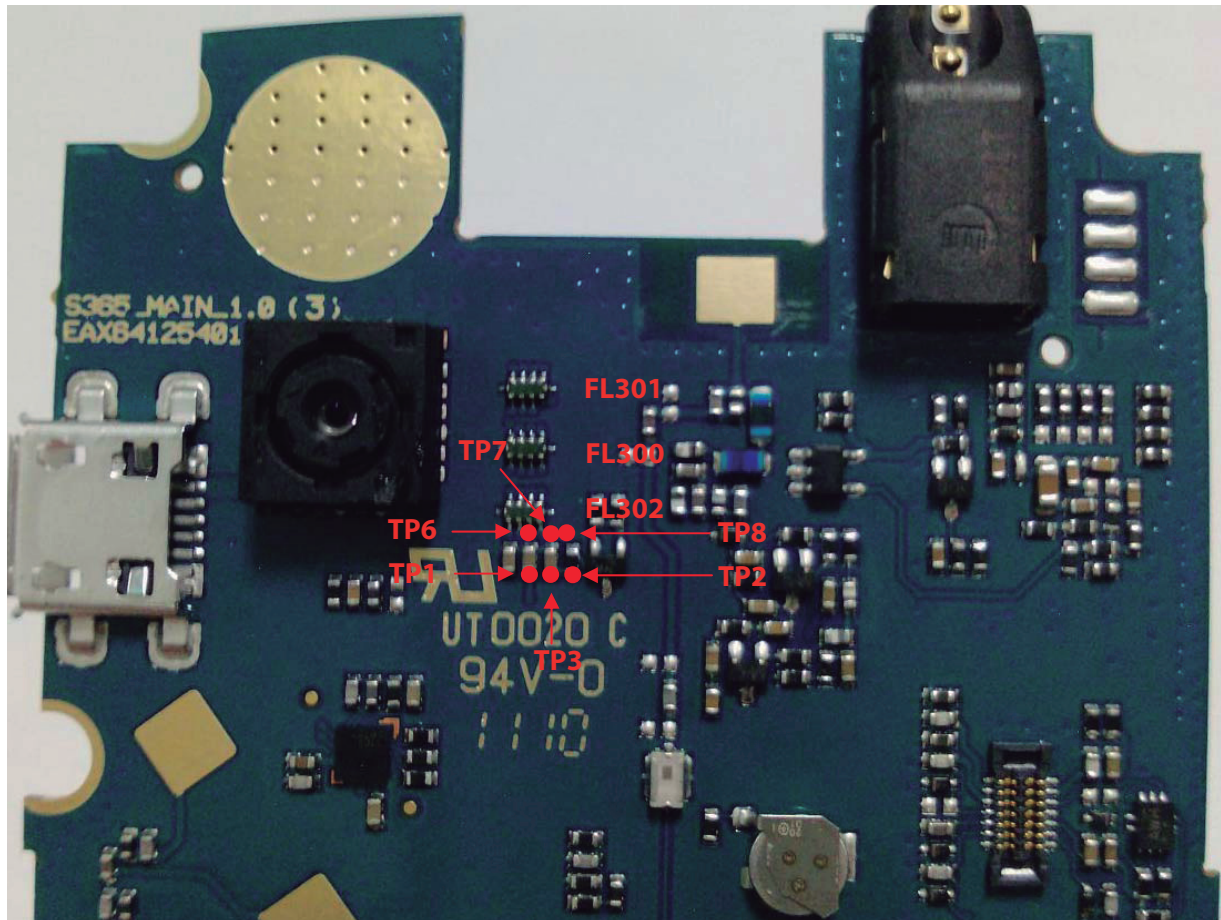


Figure 4.8

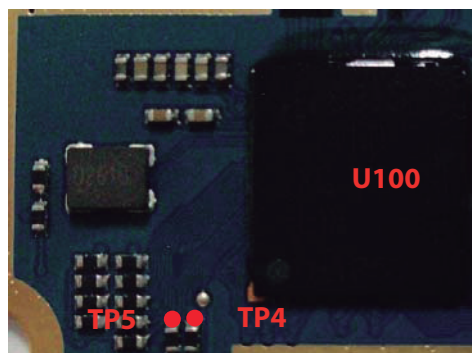
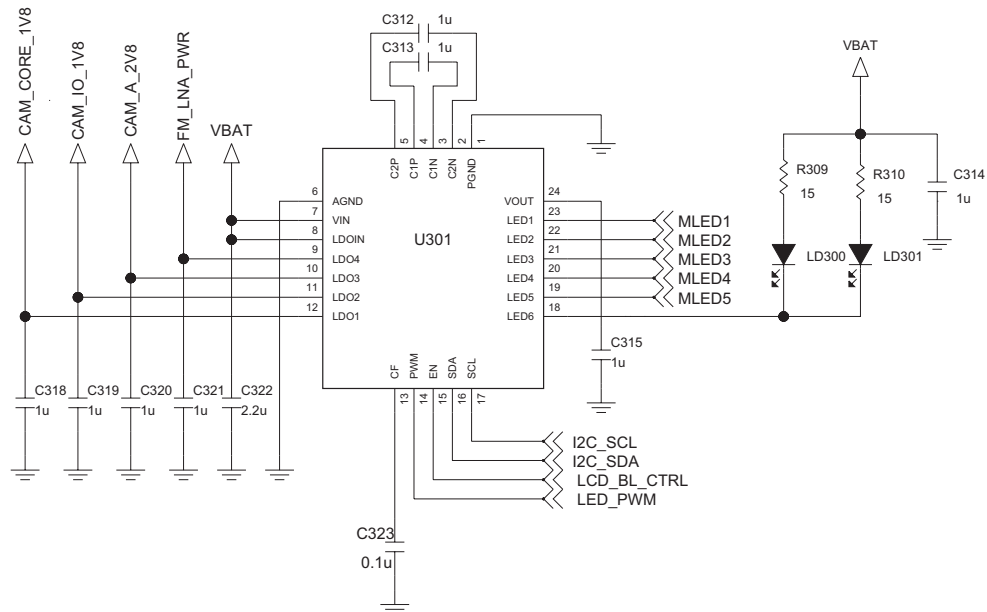
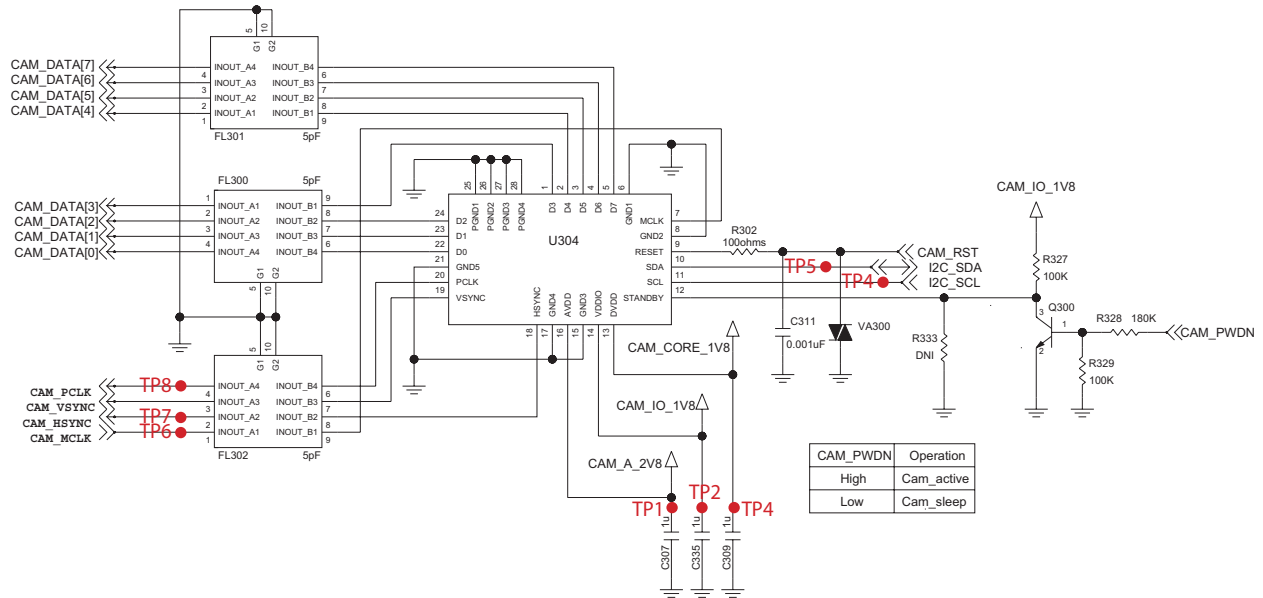


Figure 4.8.1

4. TROUBLE SHOOTING

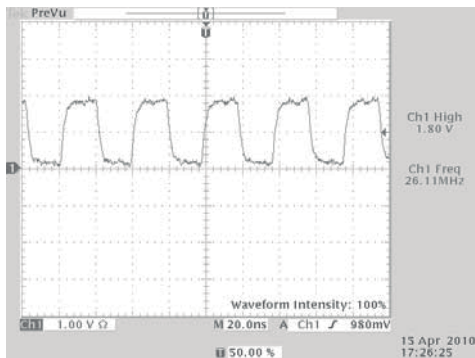
CIRCUIT



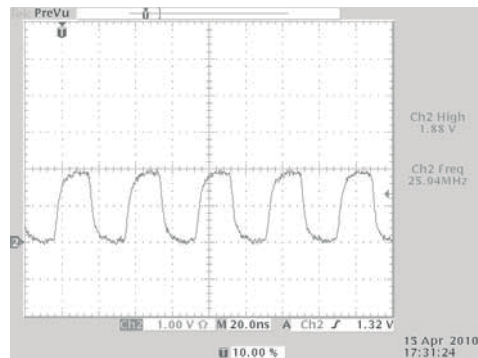
4. TROUBLE SHOOTING

Waveform

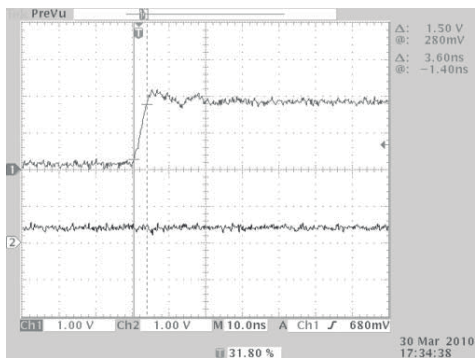
AC Characteristic



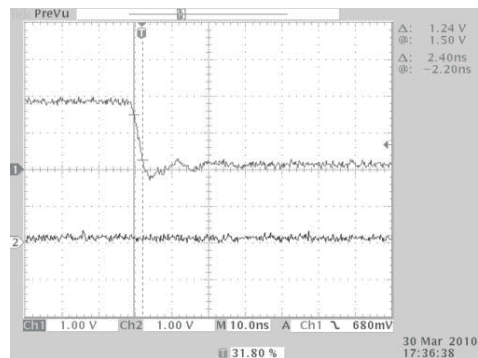
TP6→MCLK 26MHz



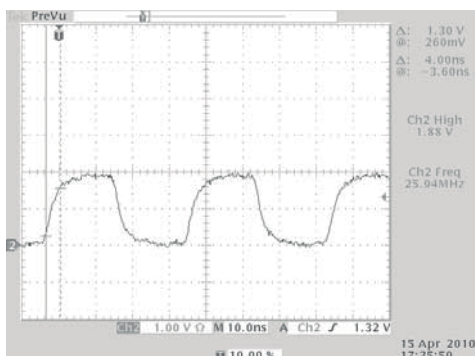
TP8→PCLK 26MHz



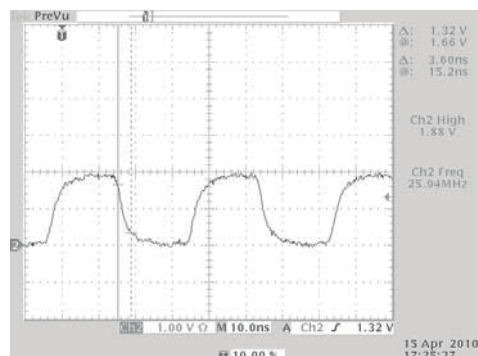
TP7→HSYNC rising time = 3.6ns



TP7→HSYNC falling time = 2.4ns

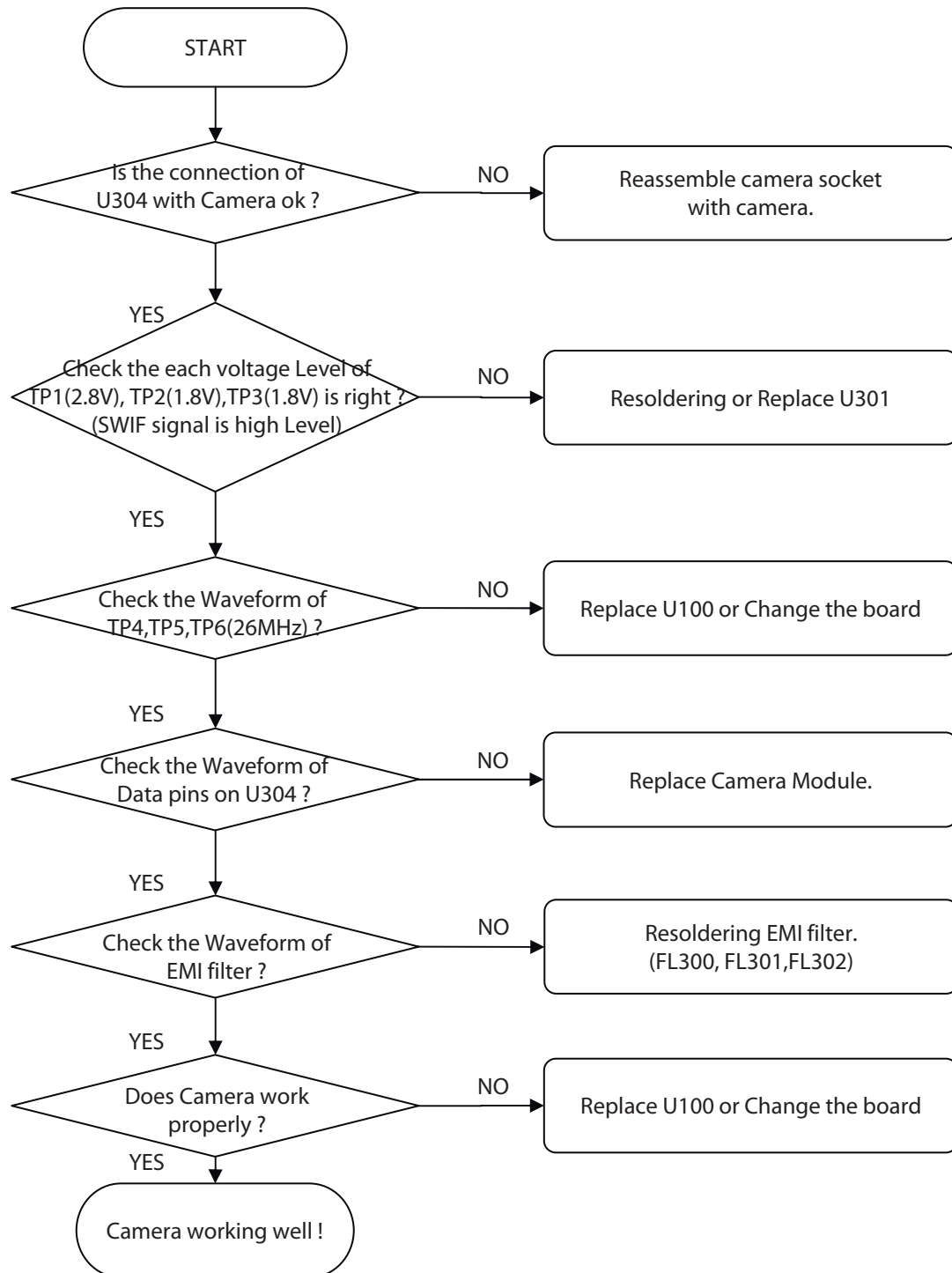


TP8→PCLK rising time = 3.6ns



TP→8PCLK falling time = 3.6ns

CHECKING FLOW



4.9 Speaker Trouble

TEST POINT

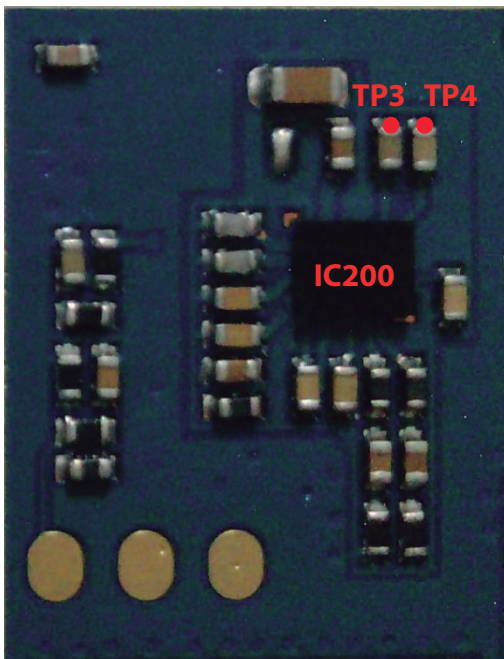


Figure 4.9

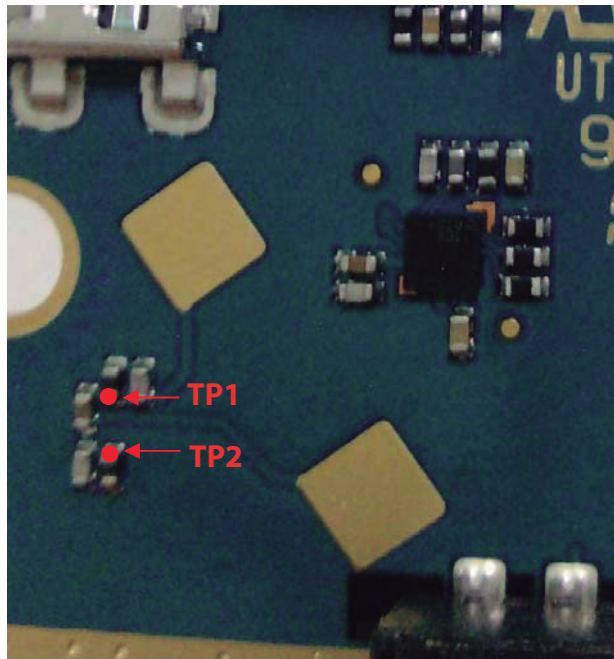
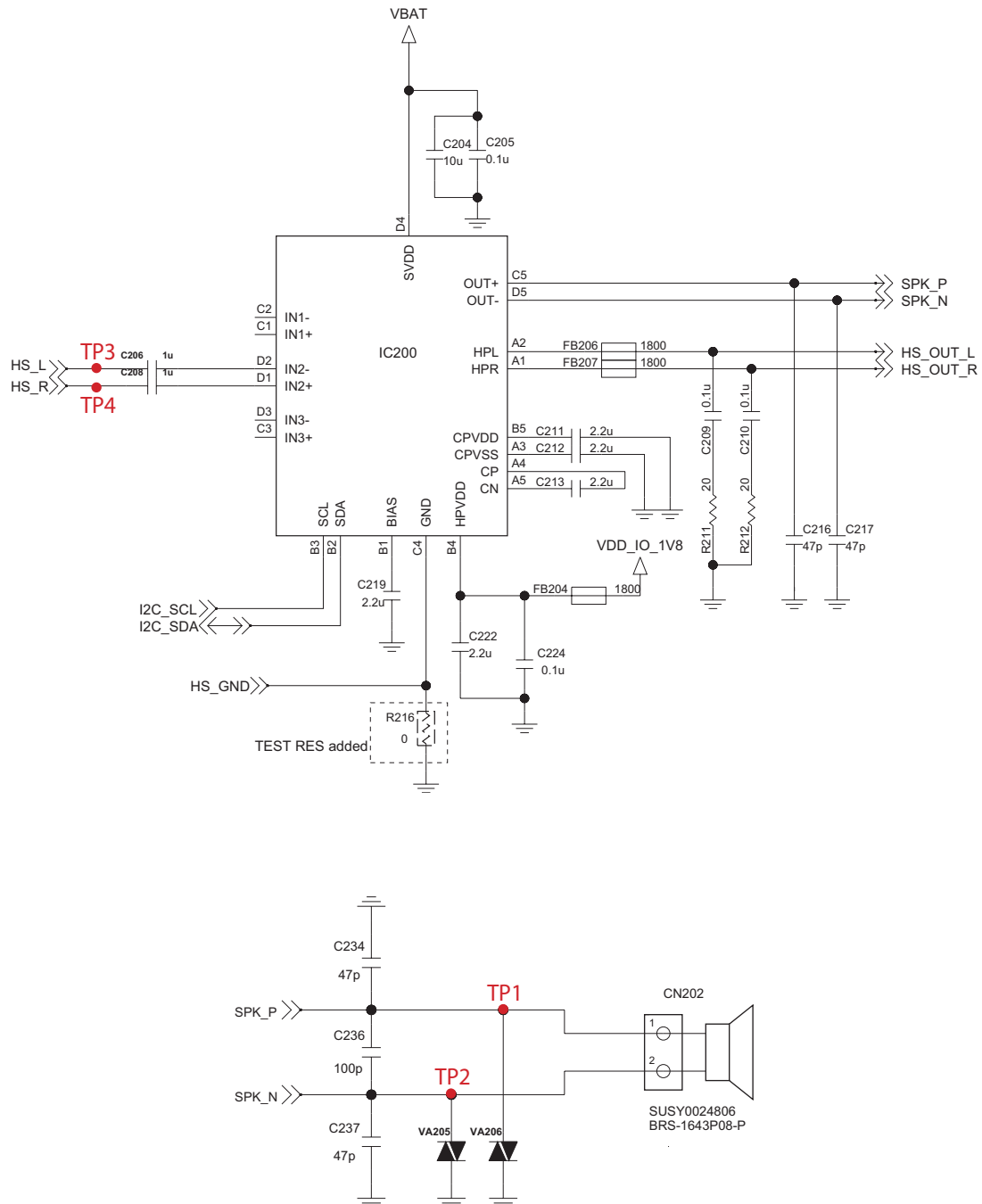


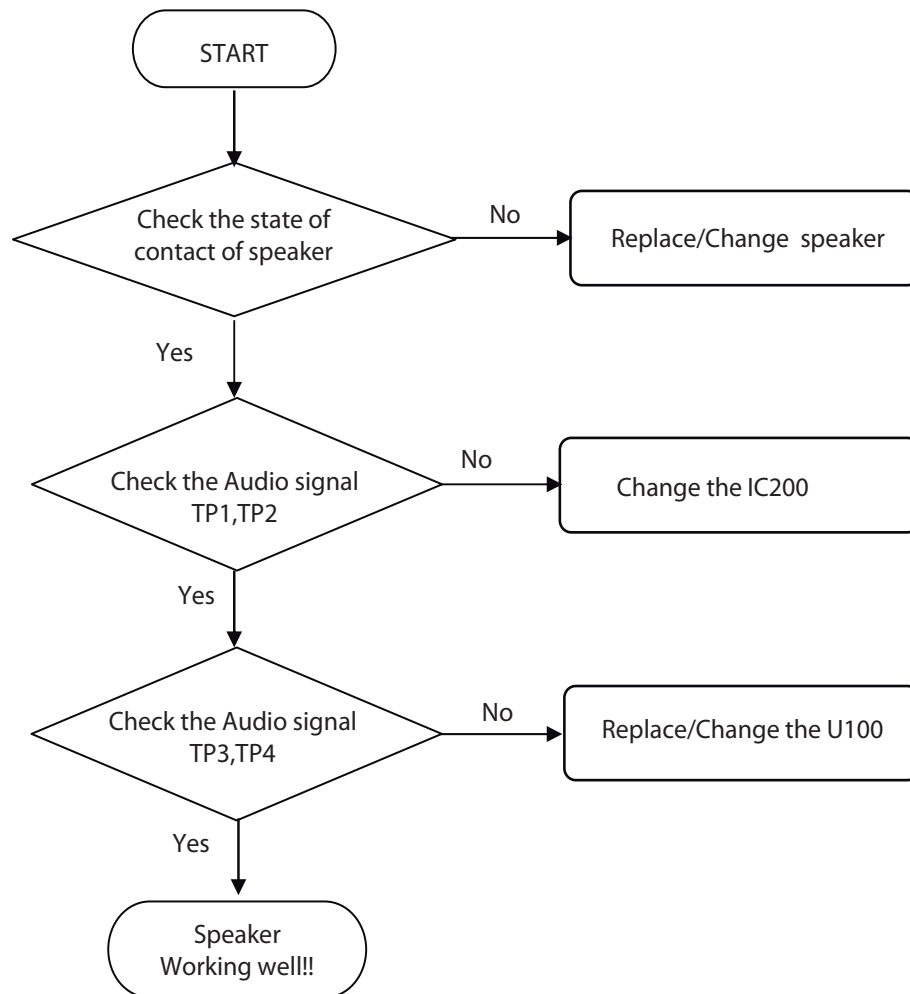
Figure 4.9.1

4. TROUBLE SHOOTING

CIRCUIT



CHECKING FLOW



4.10 Earphone Trouble

TEST POINT

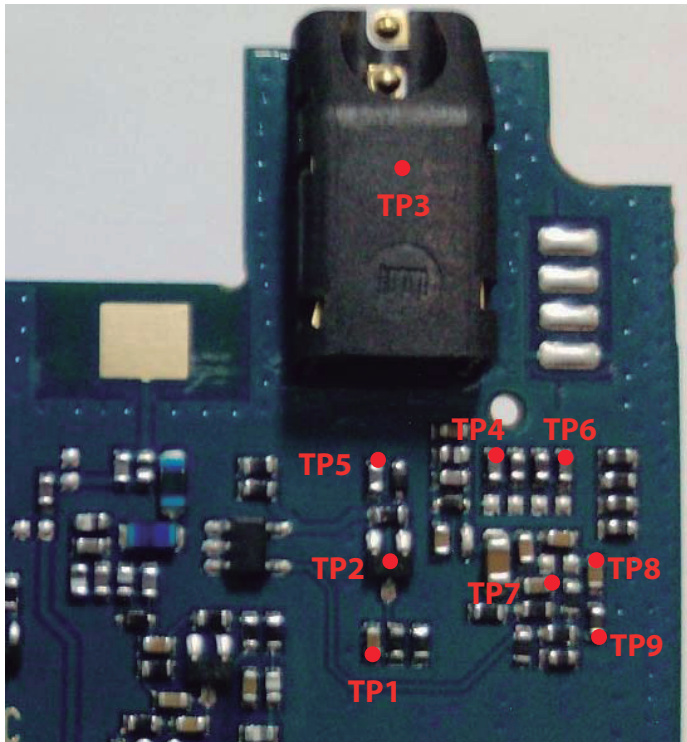


Figure 4.10

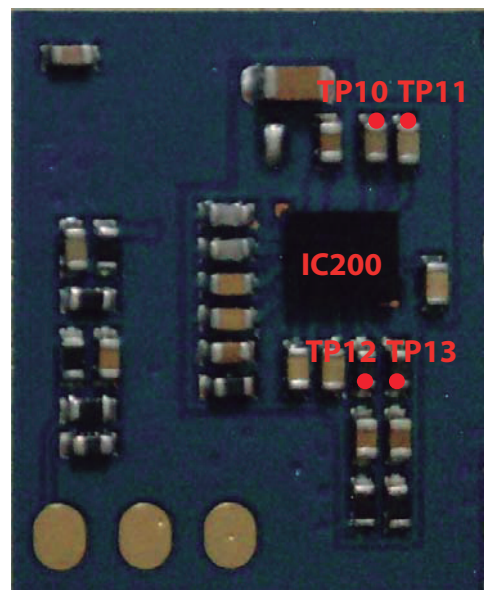
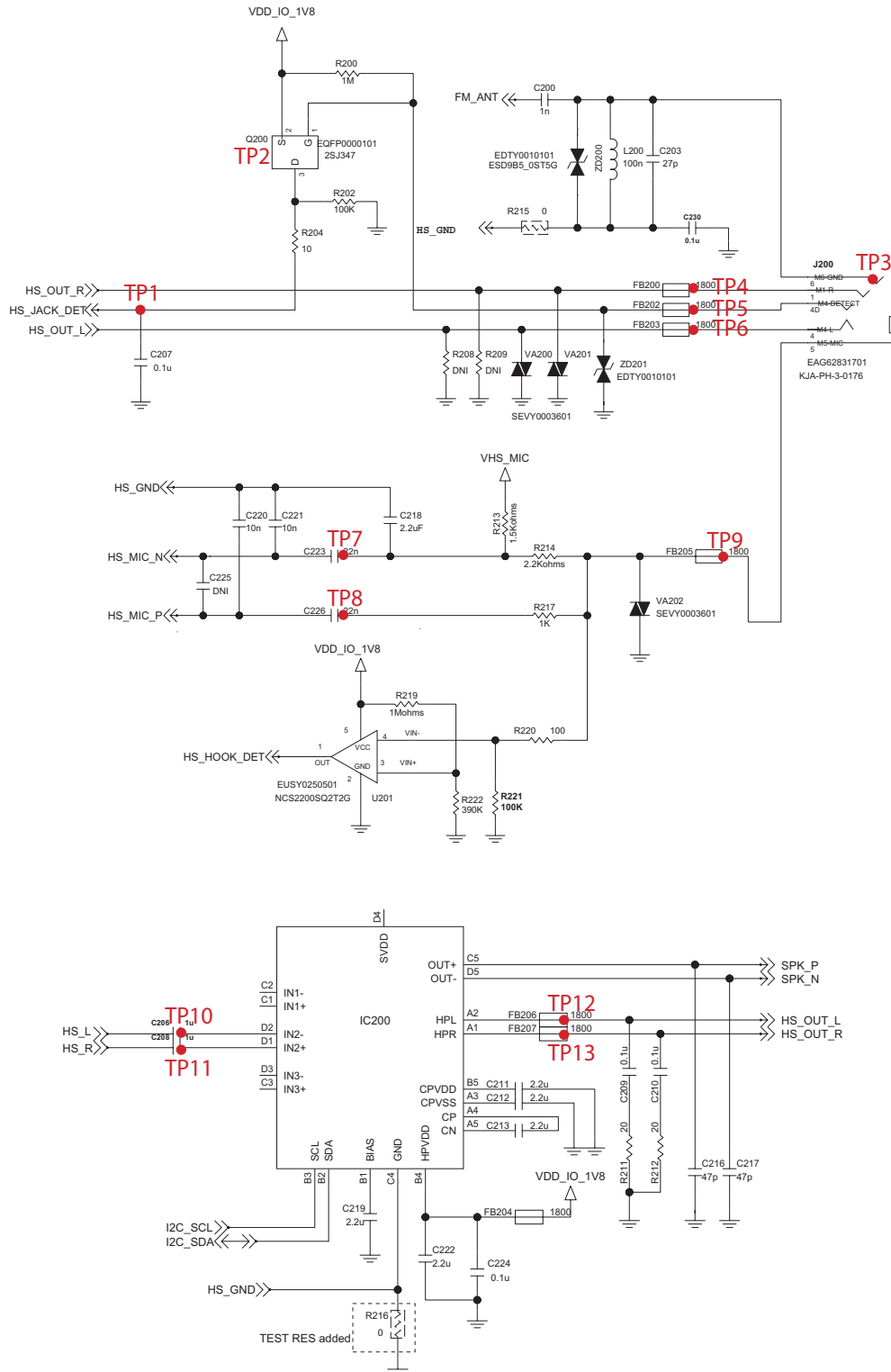
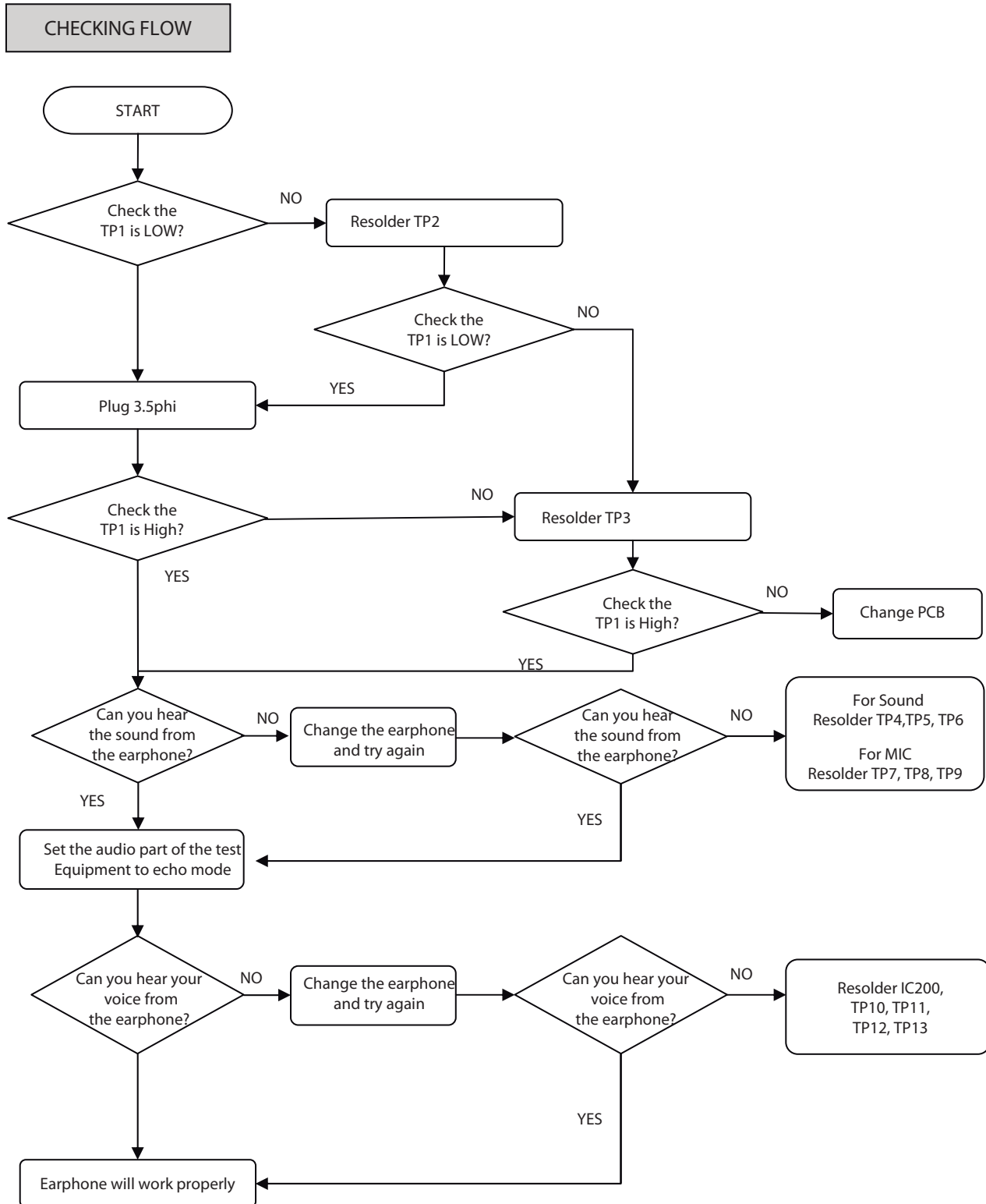


Figure 4.10.1

4. TROUBLE SHOOTING

CIRCUIT





4.11 Receiver Trouble

TEST POINT

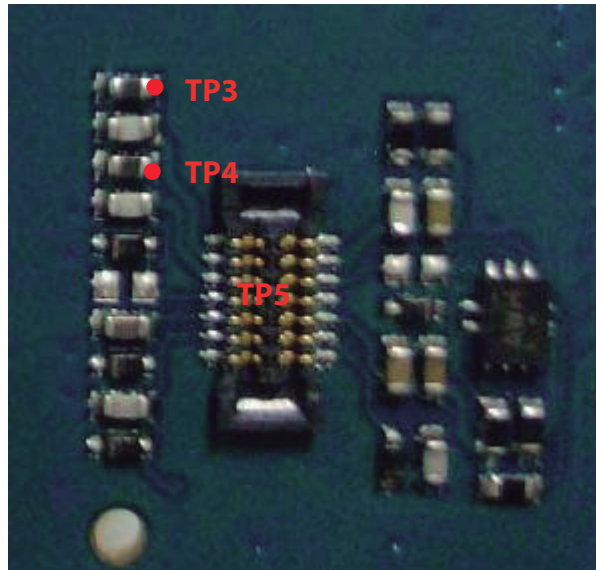


Figure 4.11

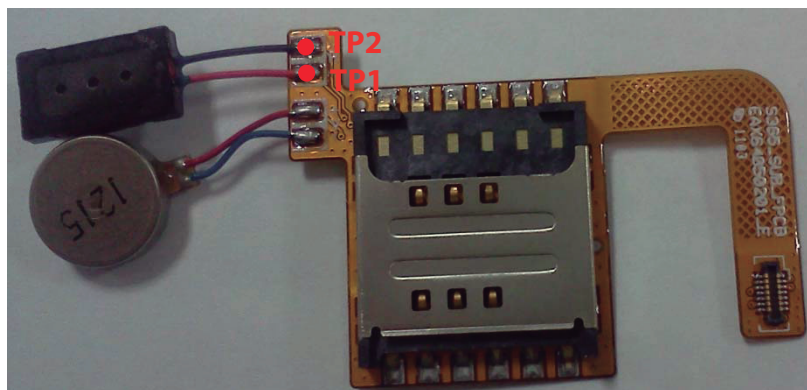
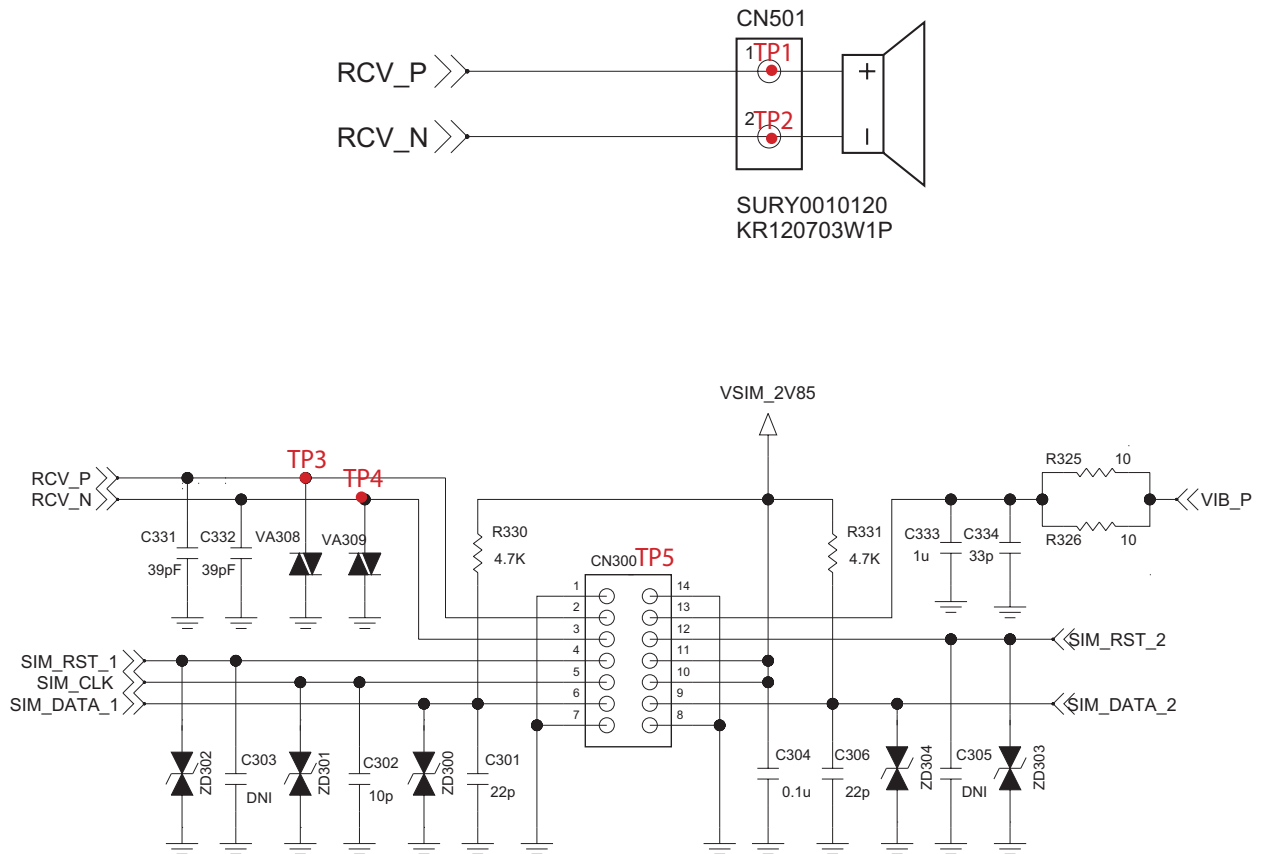


Figure 4.11.1

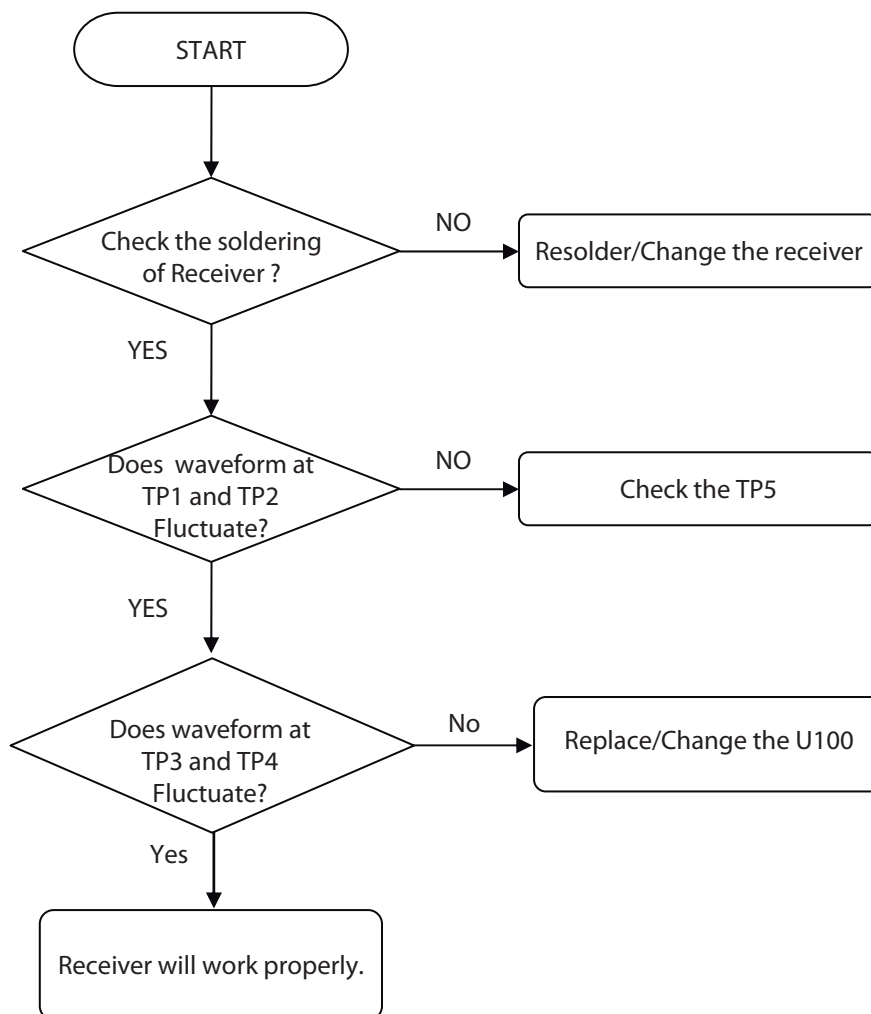
4. TROUBLE SHOOTING

CIRCUIT



CHECKING FLOW

SETTING : After initialize Agilent 8960, Test EGSM900, DCS mode (or GSM850, PCS mode)
Set the property of audio as PRBS or continuous wave. Set the receiving volume of mobile as Max.



4.12 Microphone Trouble

TEST POINT

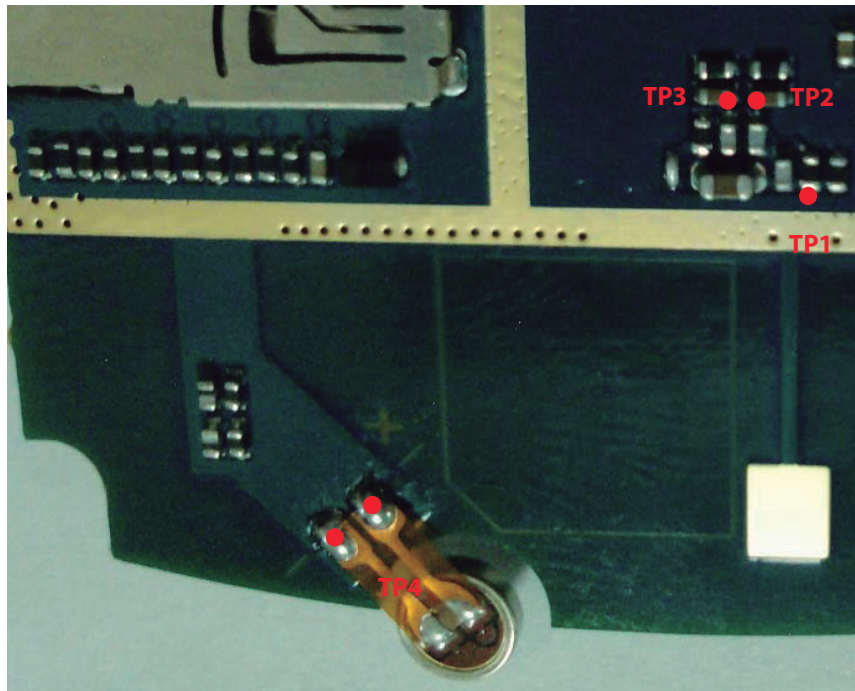
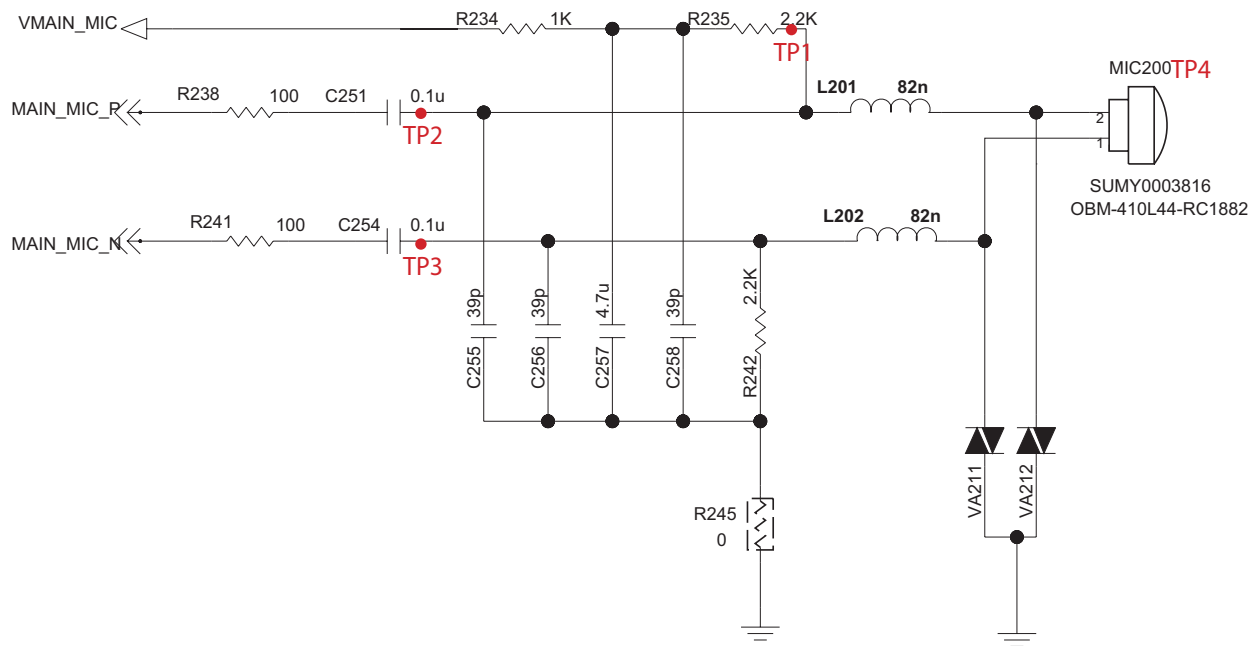


Figure 4.12

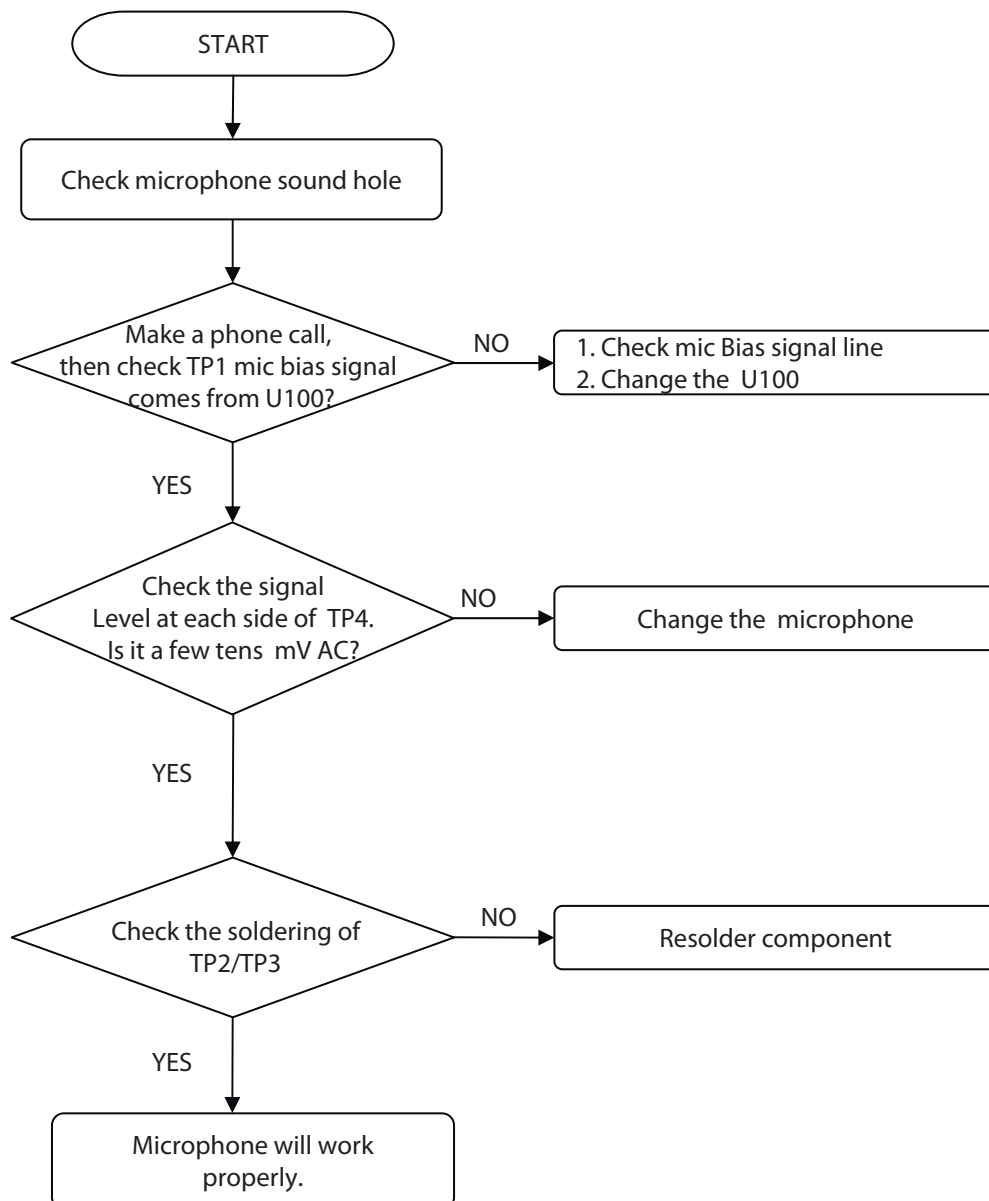
4. TROUBLE SHOOTING

CIRCUIT



CHECKING FLOW

SETTING : After initialize Agilent 8960, Test EGSM900, DCS mode (or GSM850, PCS mode)



4.13 SIM Card Interface Trouble

TEST POINT

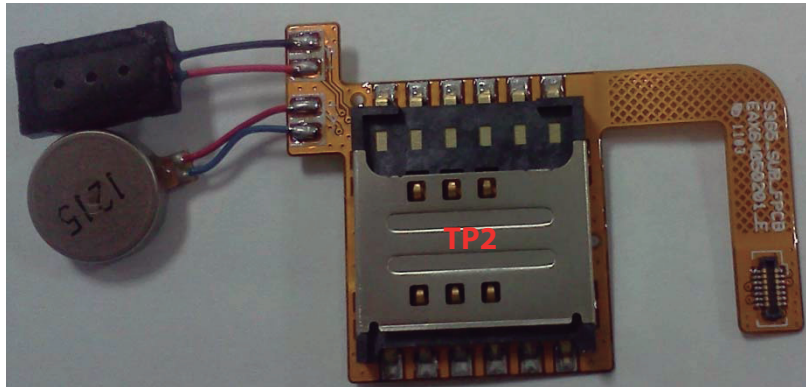


Figure 4.13

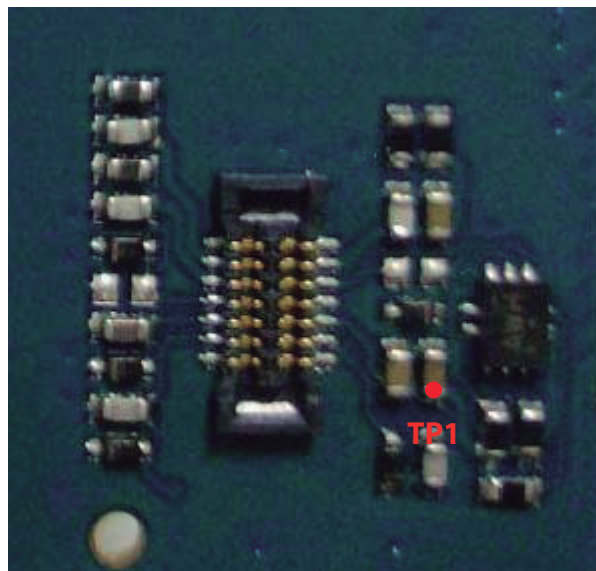
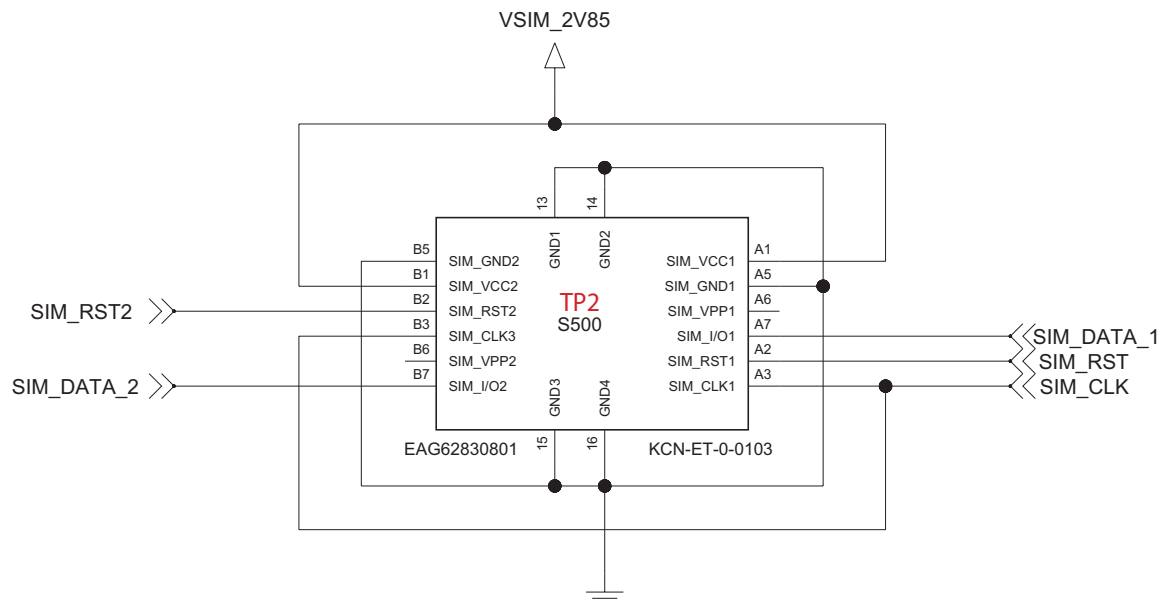
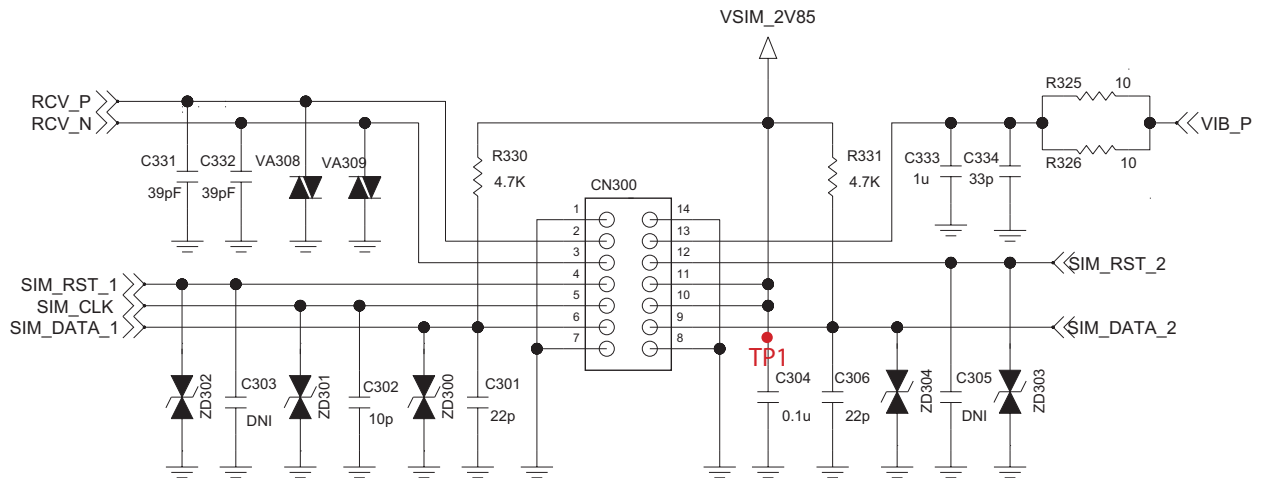
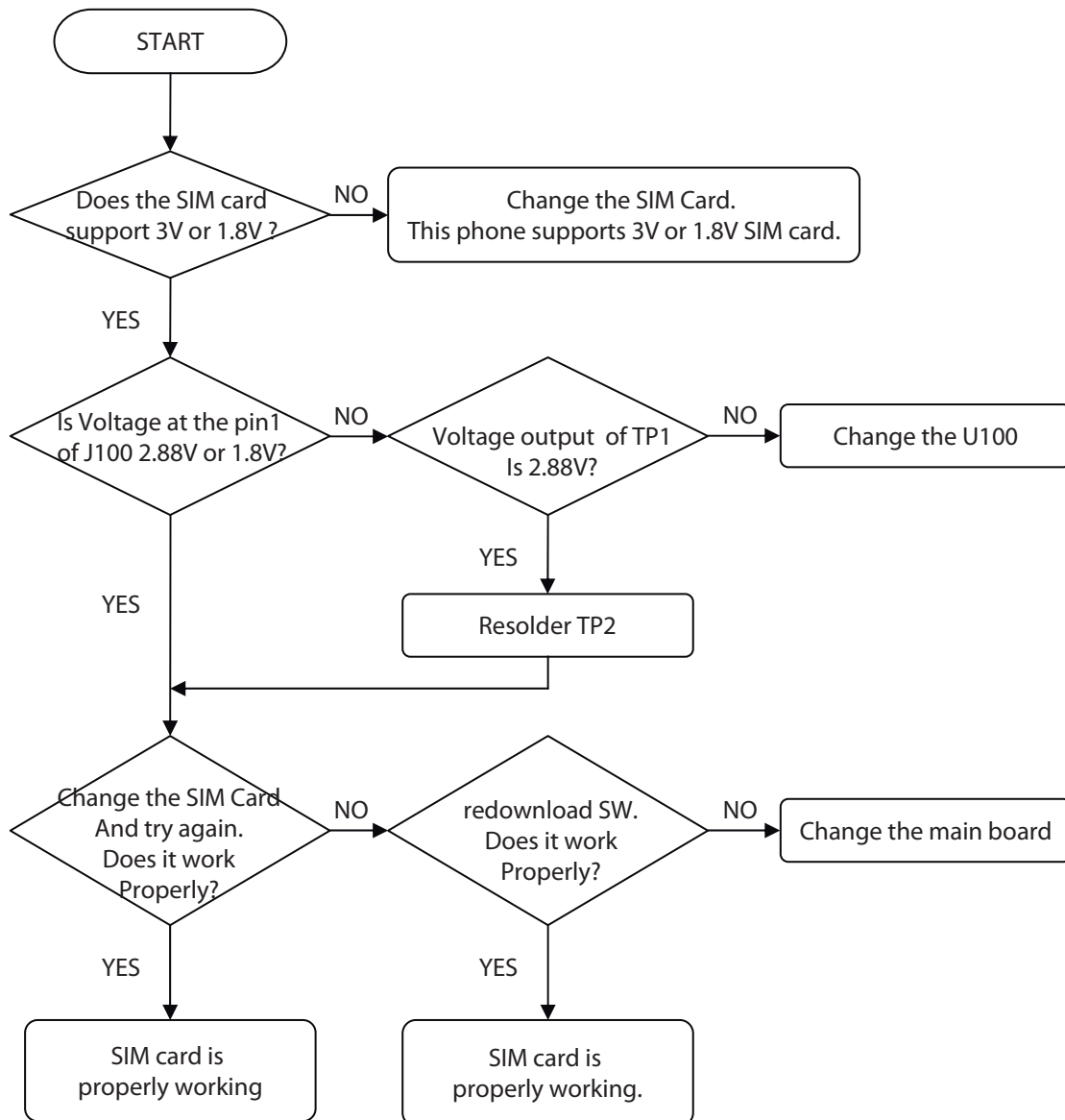


Figure 4.13.1

CIRCUIT



CHECKING FLOW



4.14 KEY backlight Trouble

TEST POINT

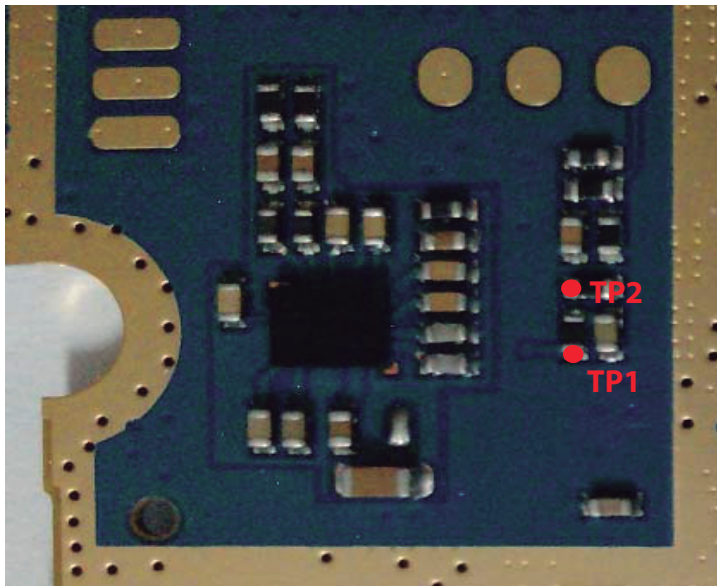


Figure 4.14

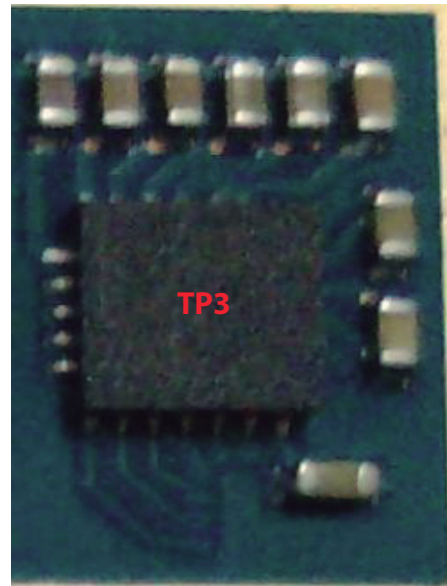


Figure 4.14.1

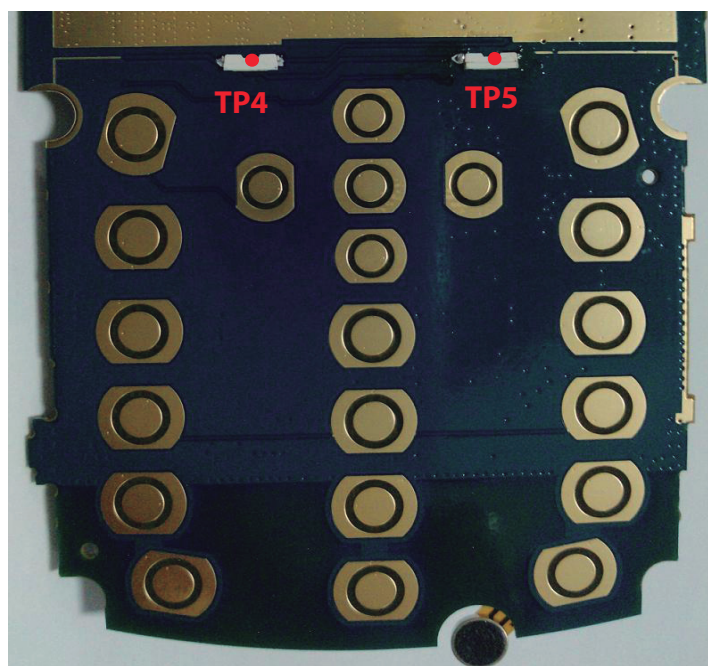
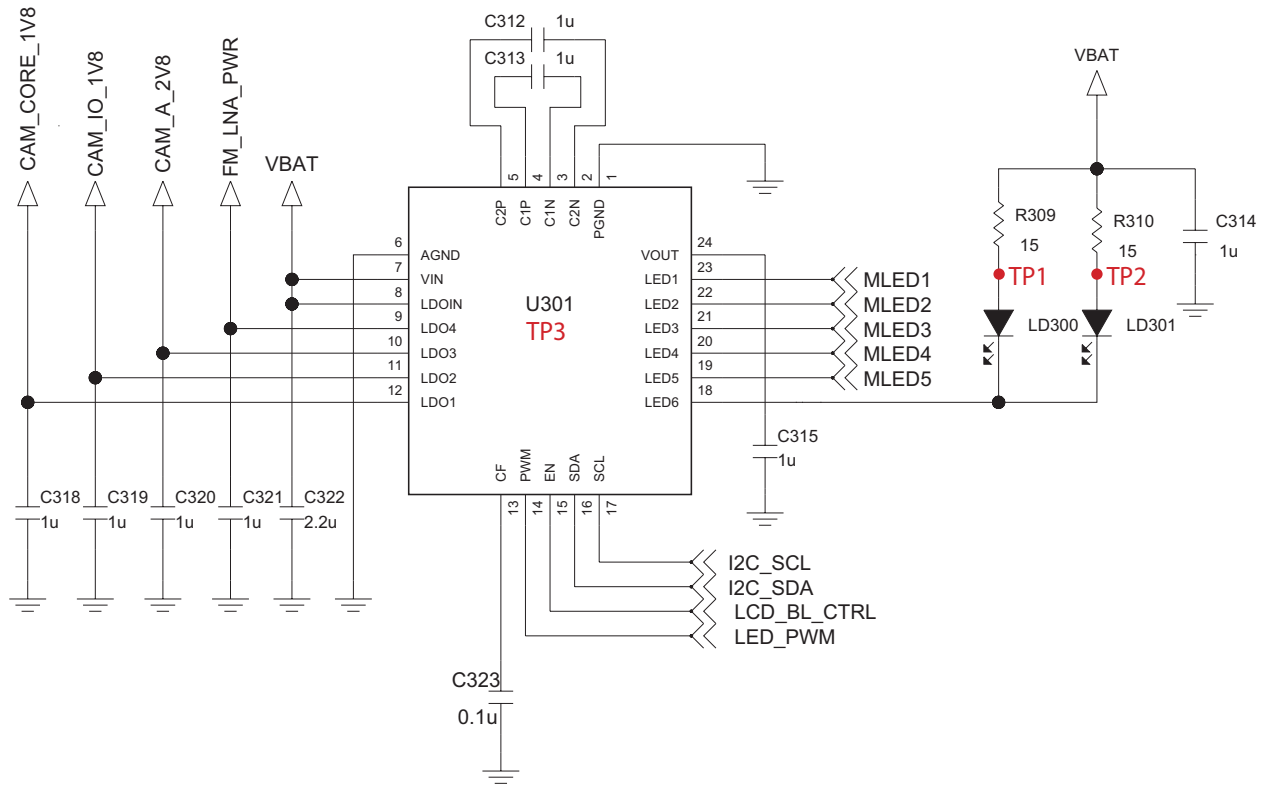
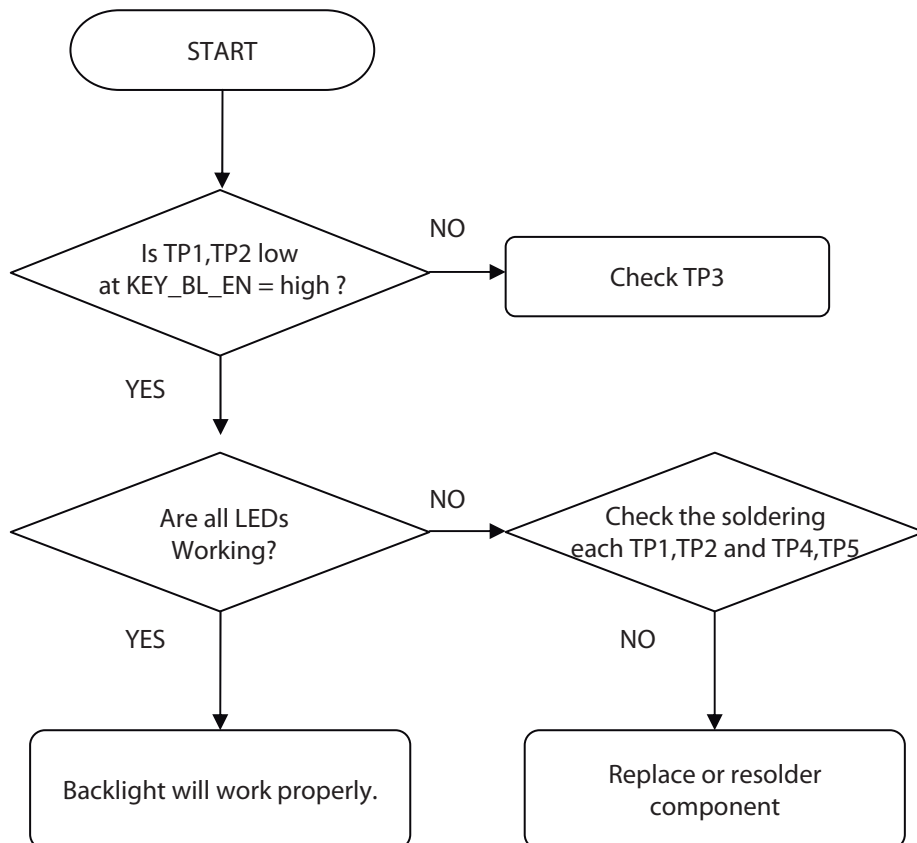


Figure 4.14.2

CIRCUIT



CHECKING FLOW



4.15 Micro SD (uSD) Trouble

TEST POINT

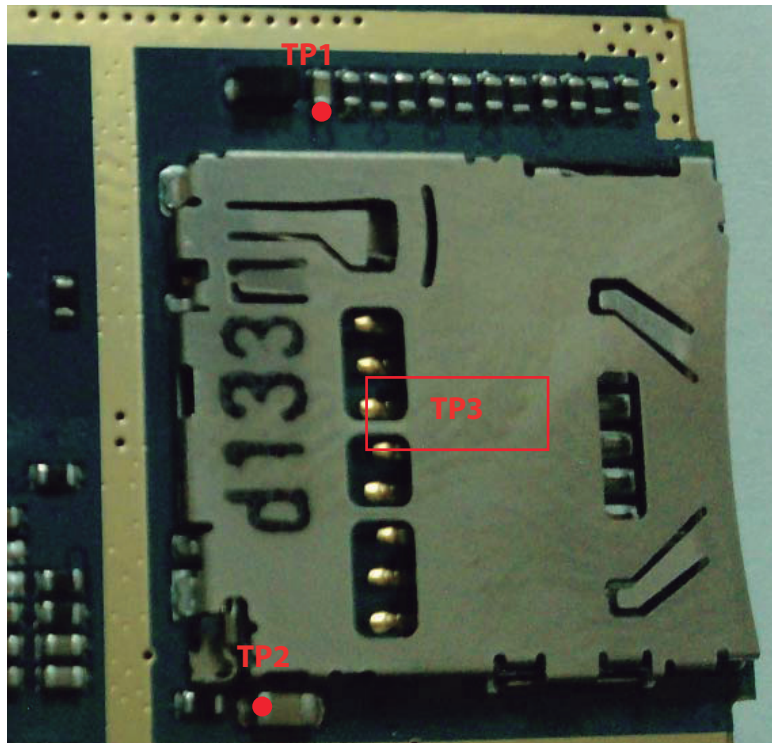
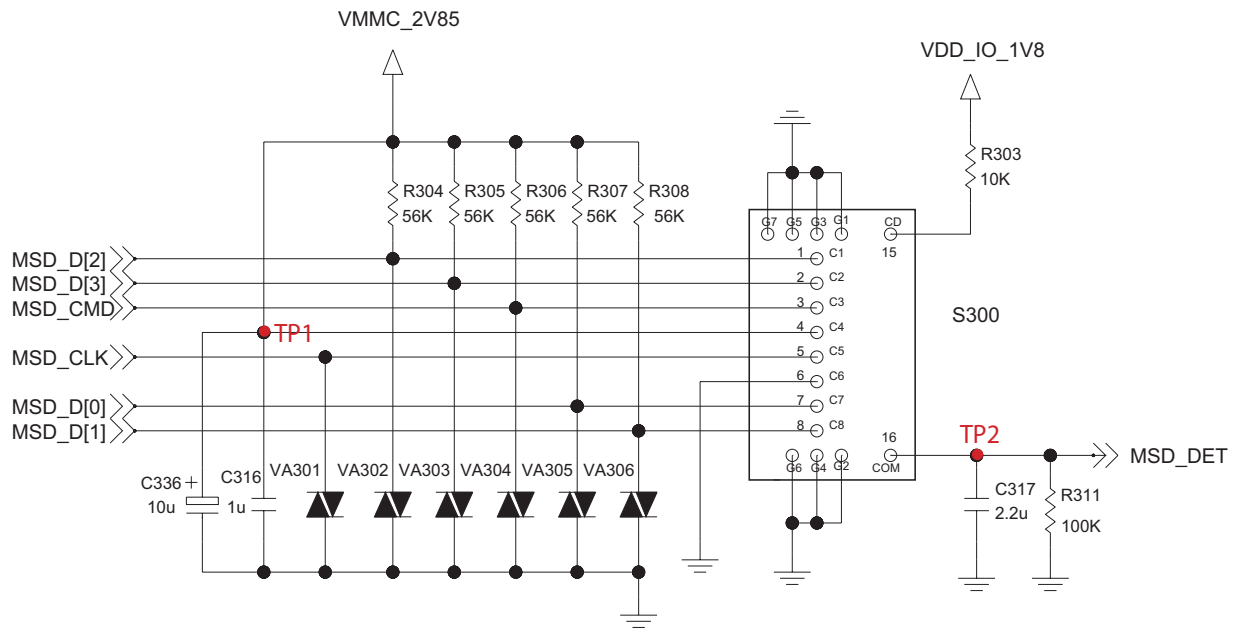
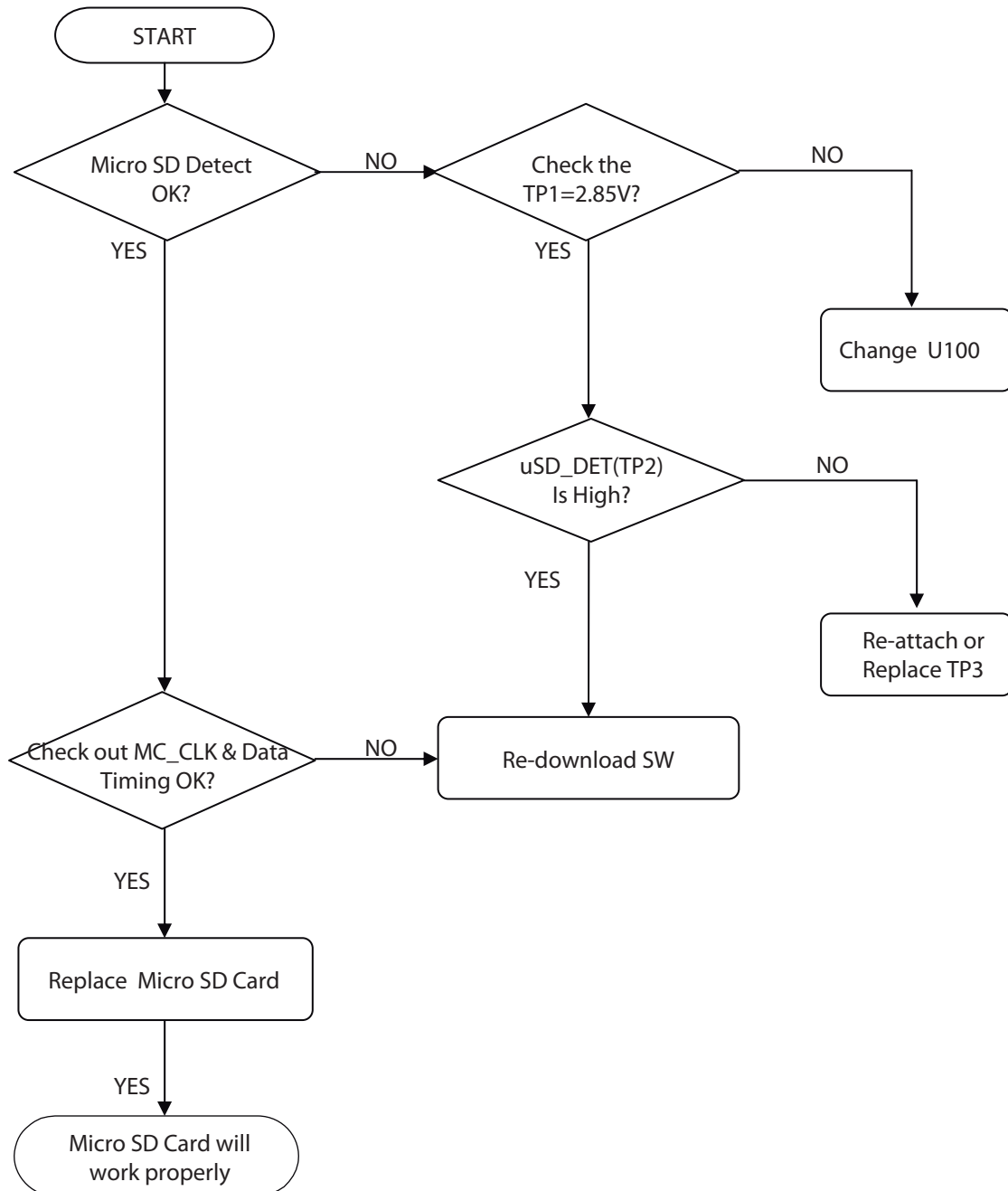


Figure 4.15

CIRCUIT



CHECKING FLOW



4.16 Bluetooth Trouble

TEST POINT

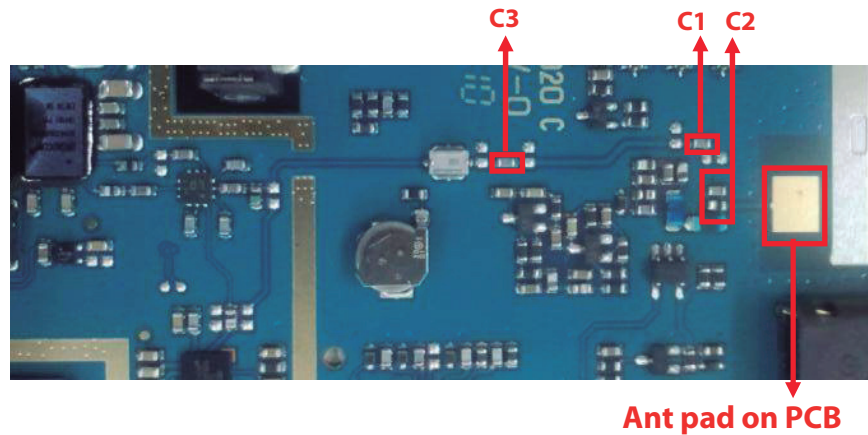
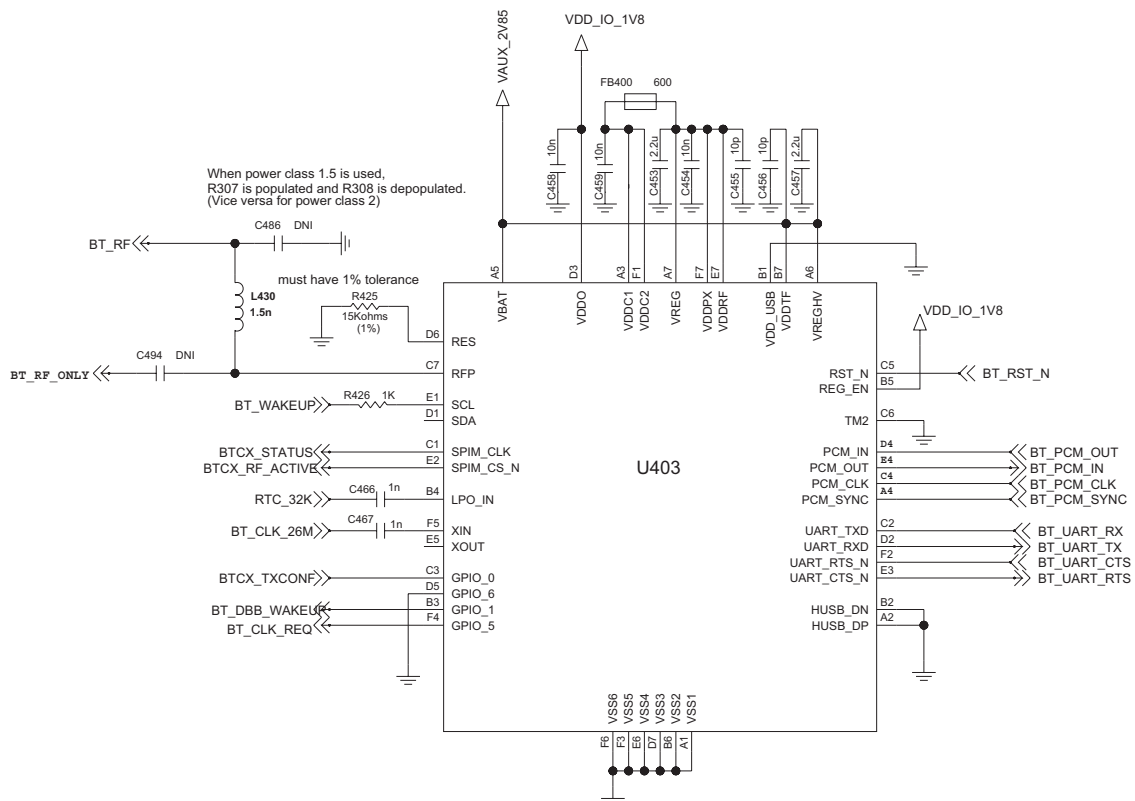
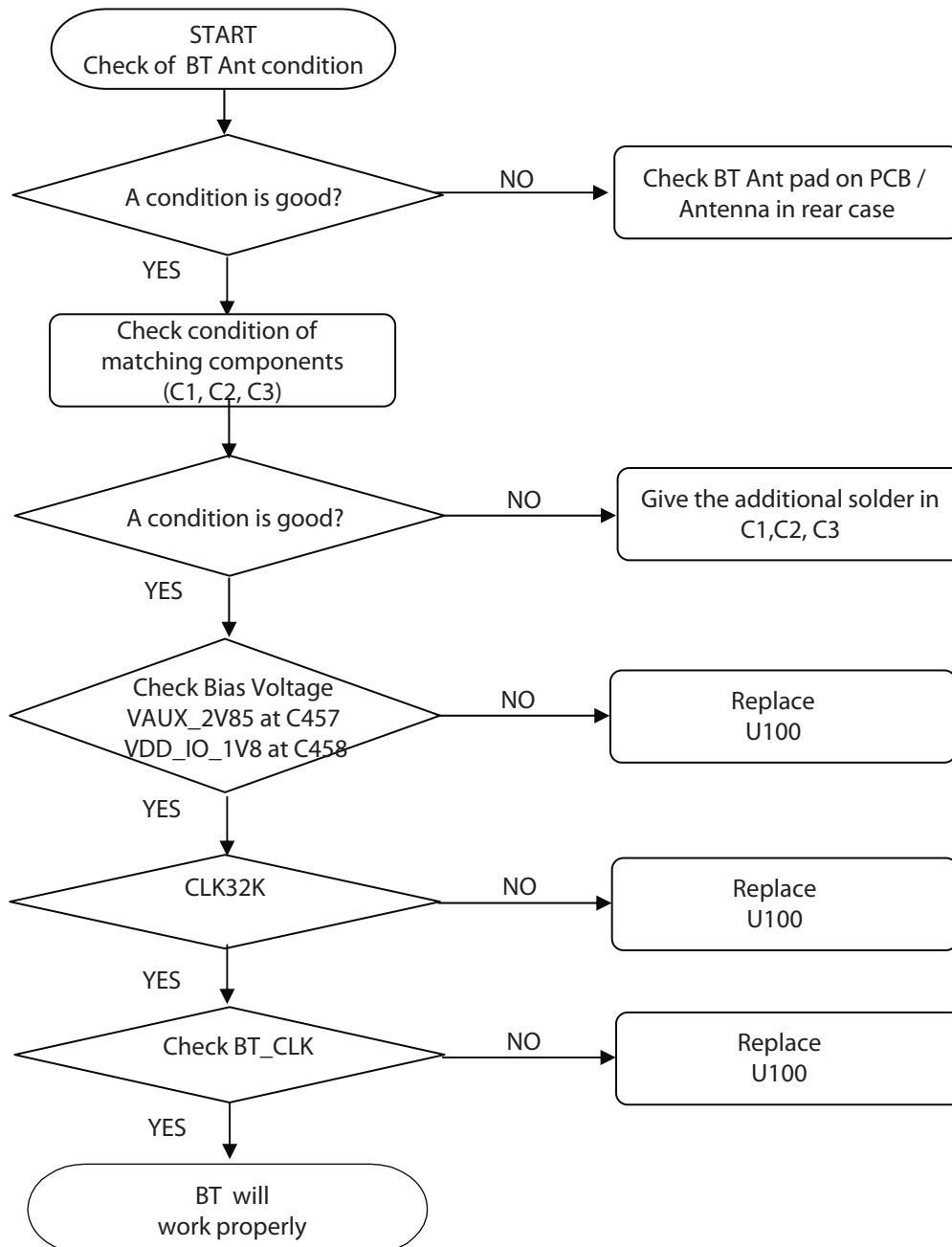


Figure 4.16.1

CIRCUIT

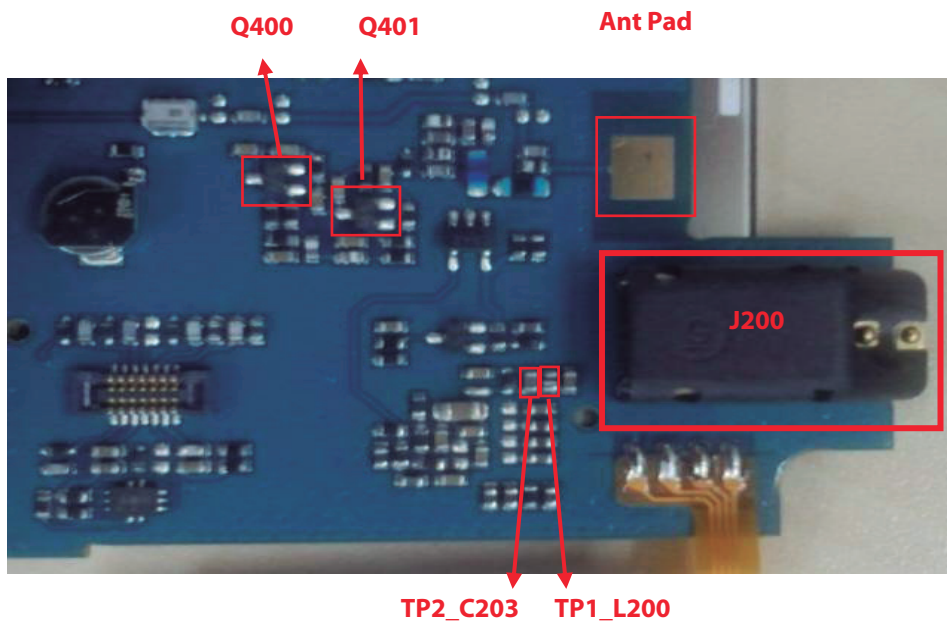


CHECKING FLOW

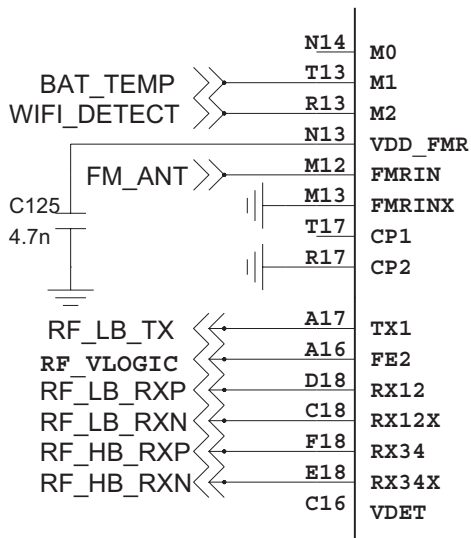


4.17 FM Radio Trouble

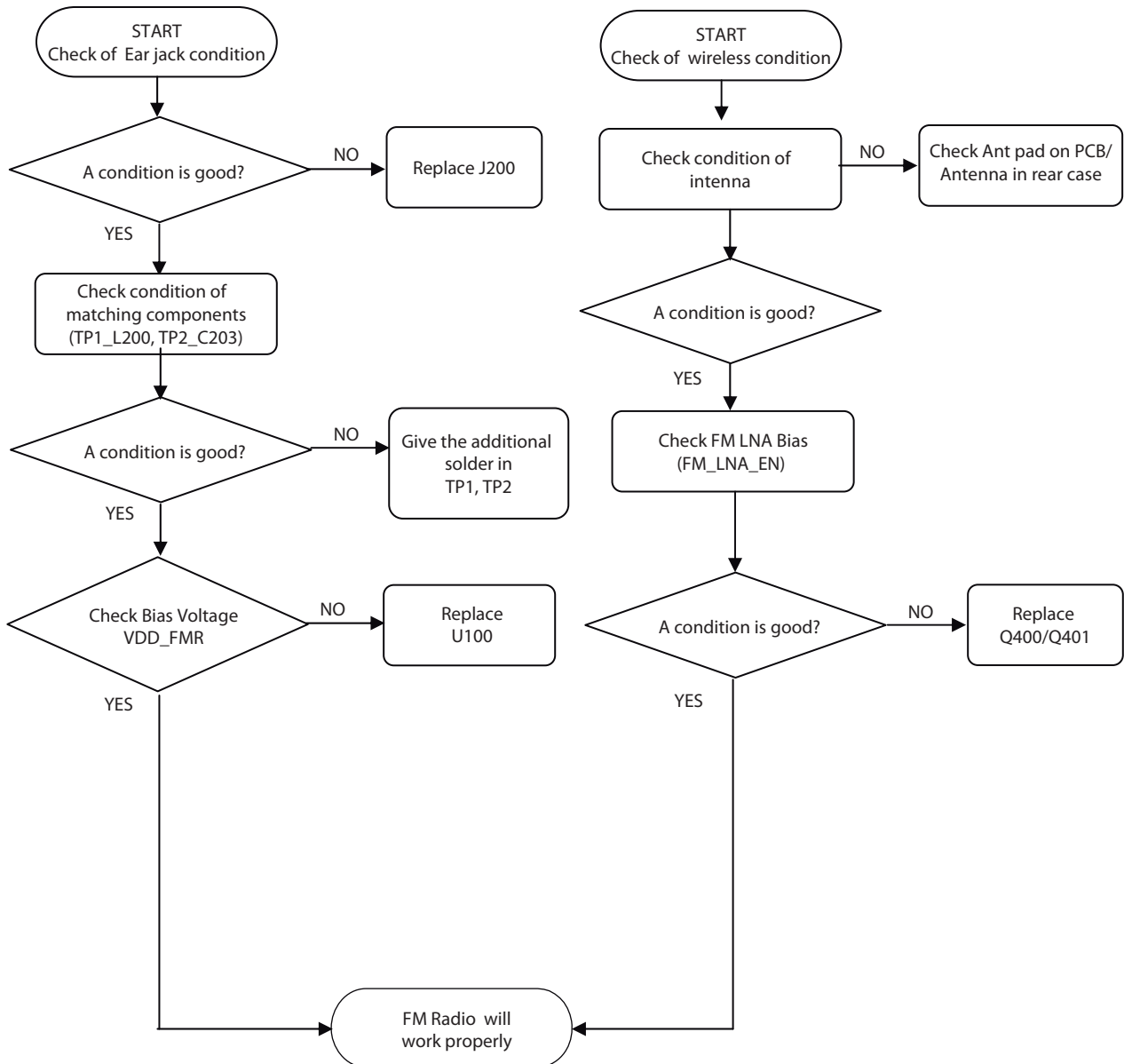
TEST POINT



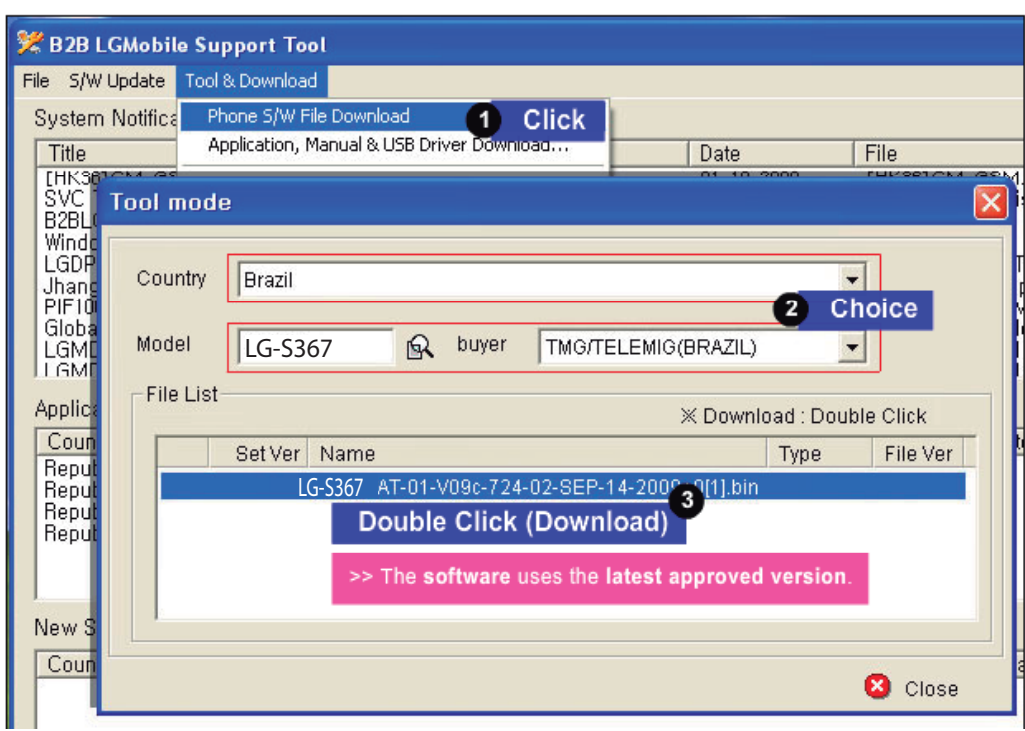
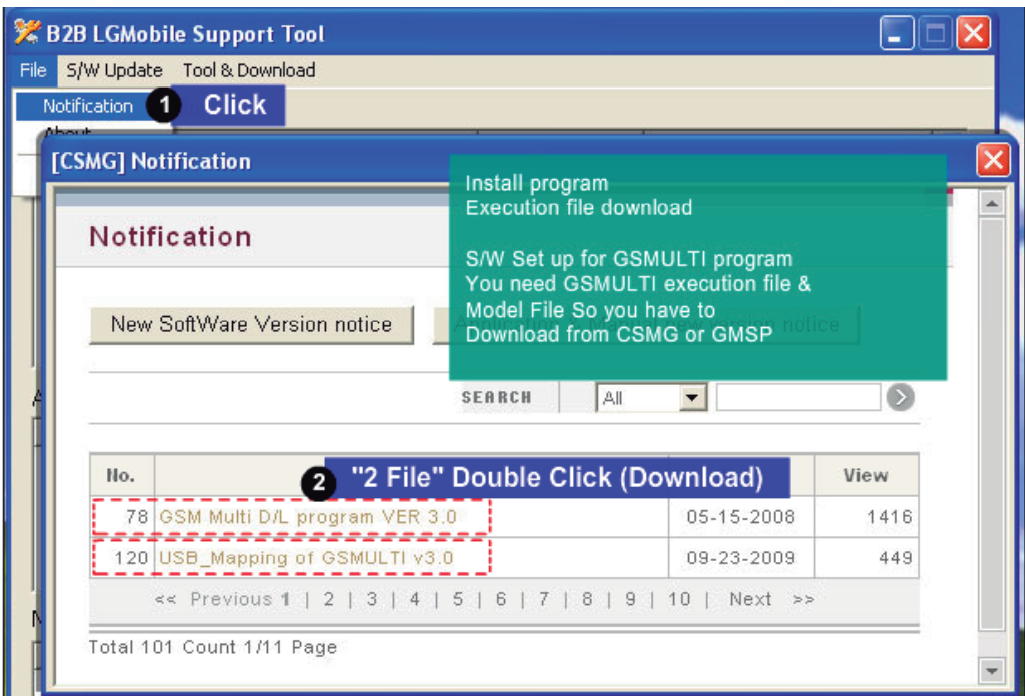
CIRCUIT



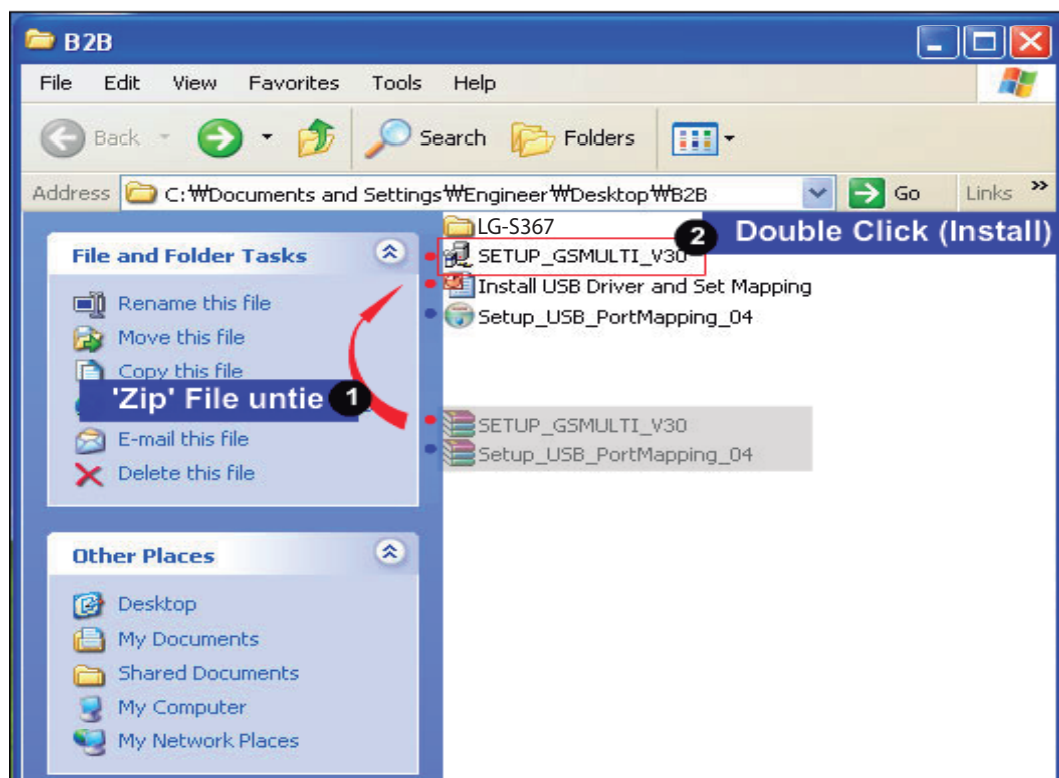
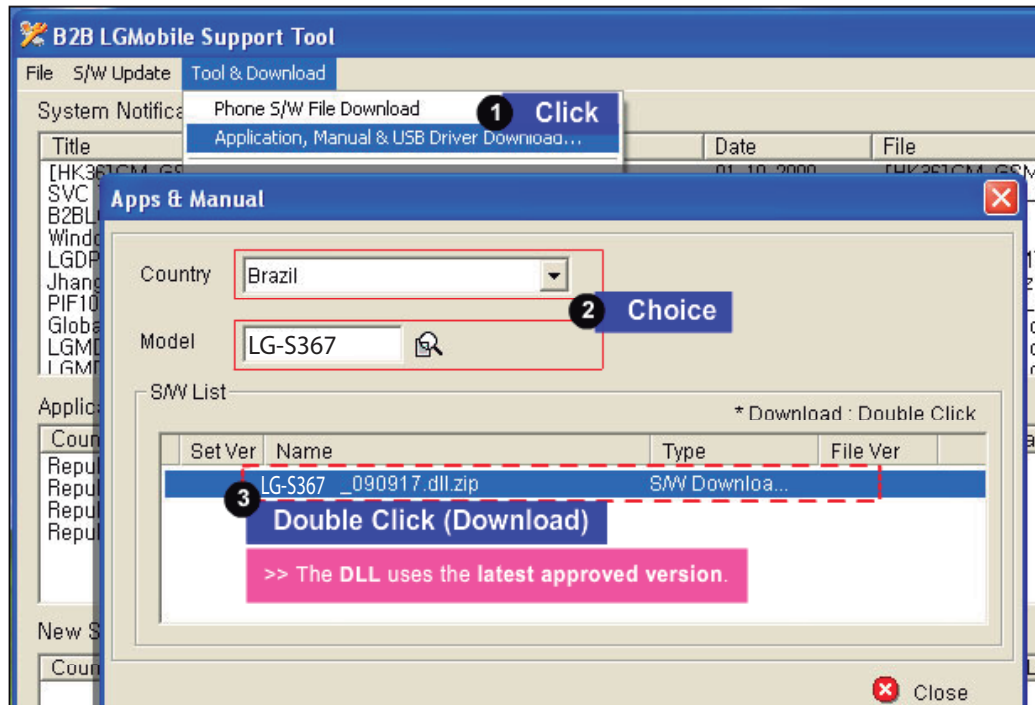
CHECKING FLOW



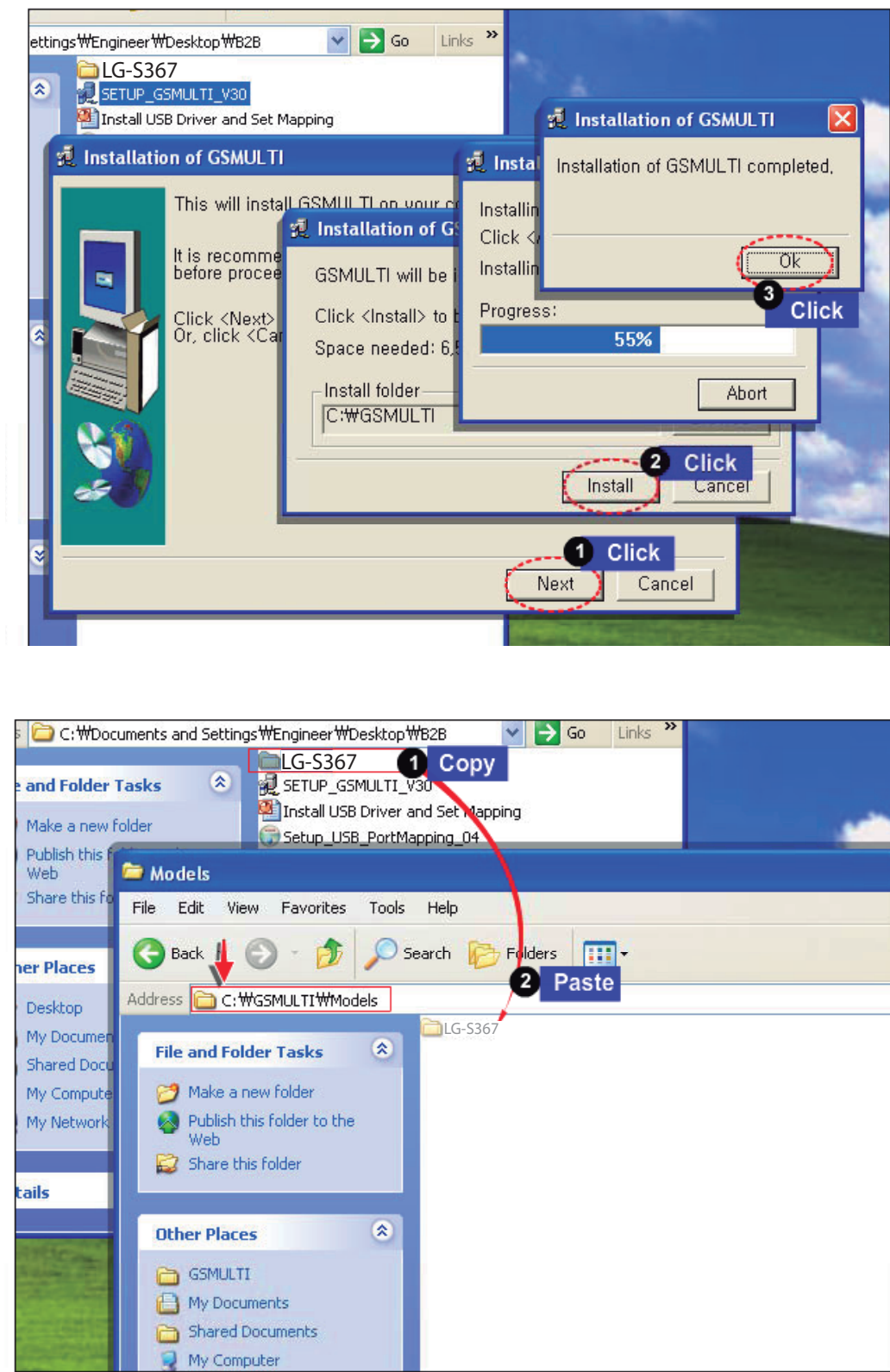
5. DOWNLOAD



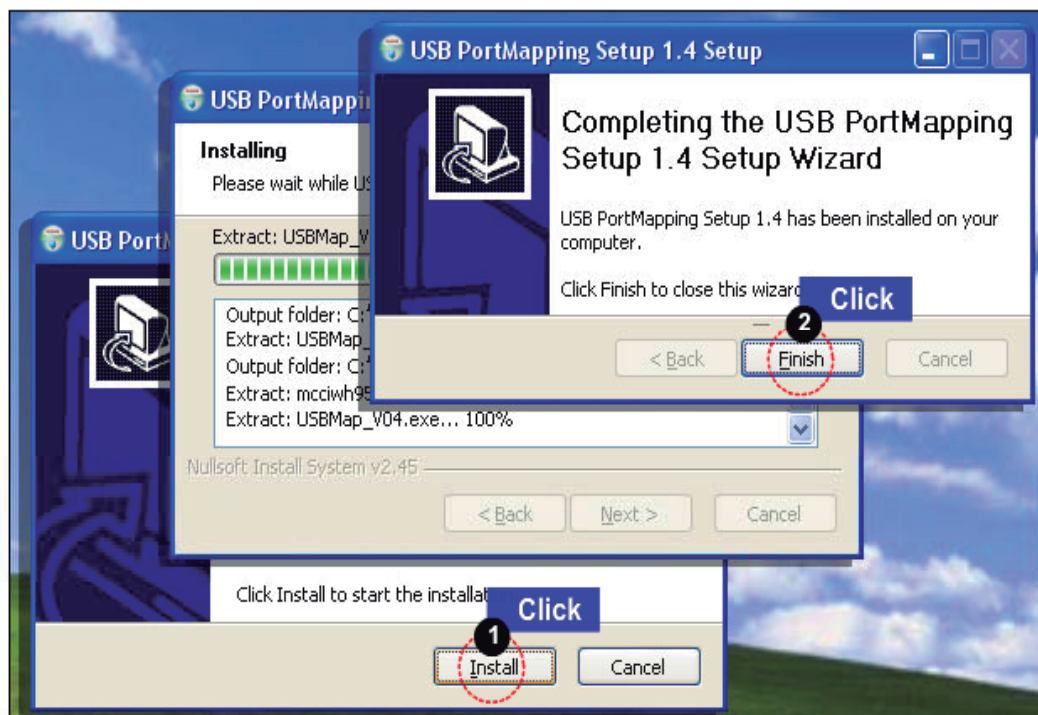
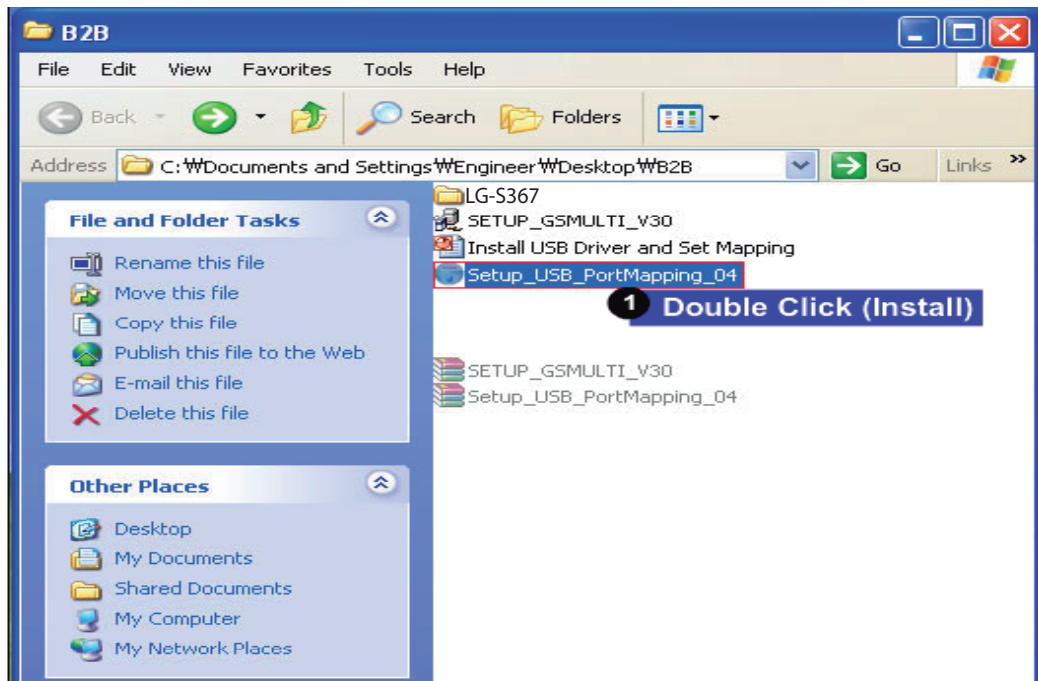
5. DOWNLOAD



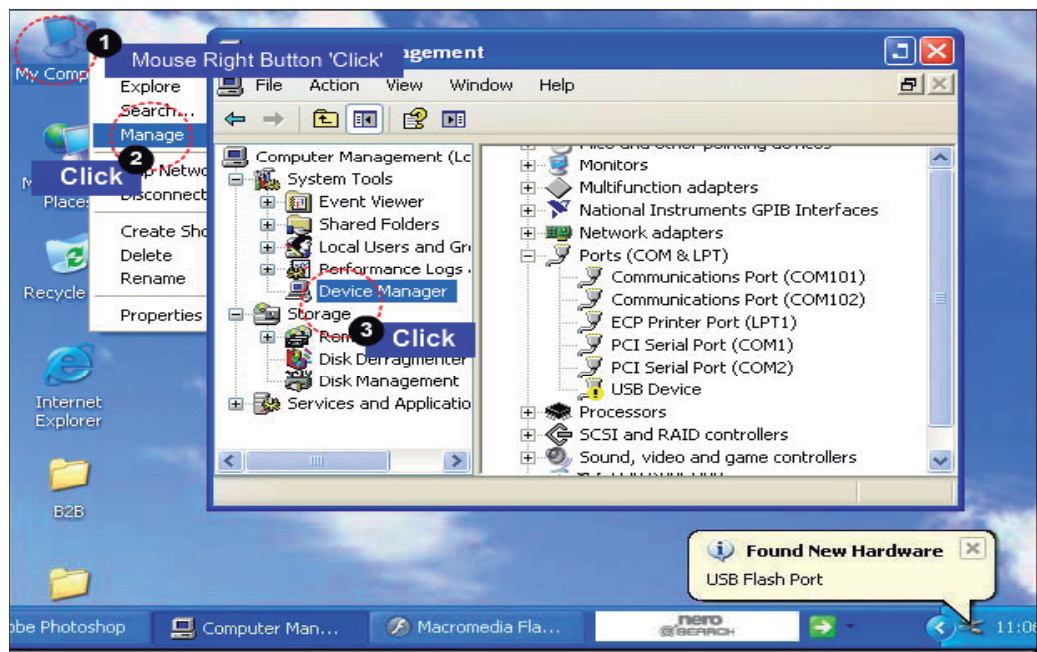
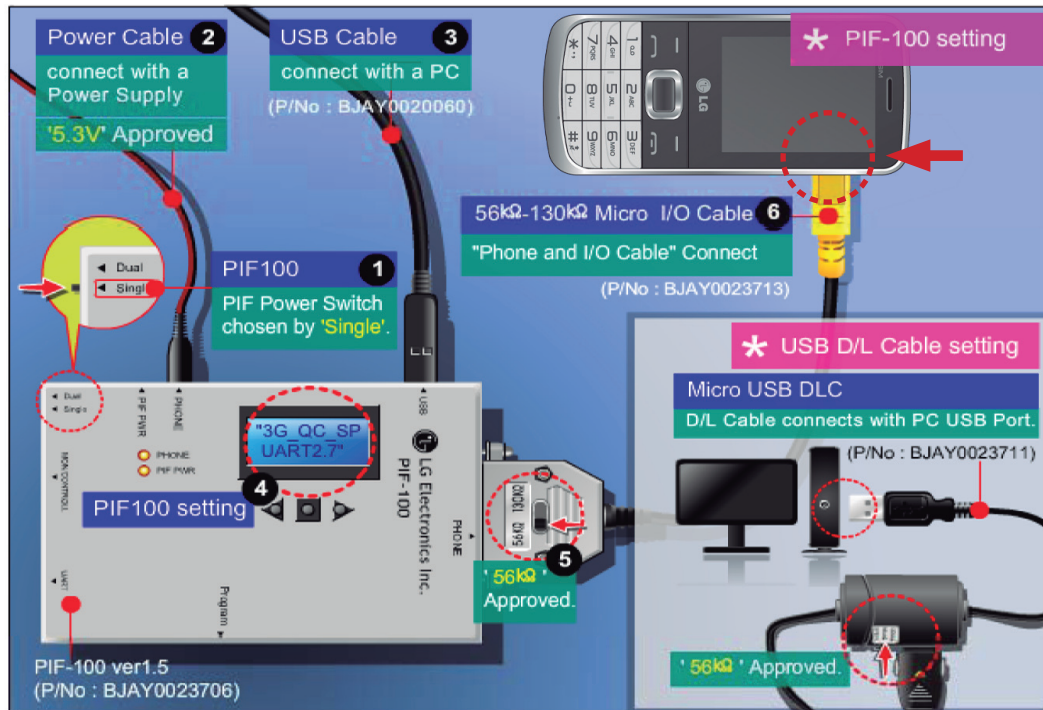
5. DOWNLOAD

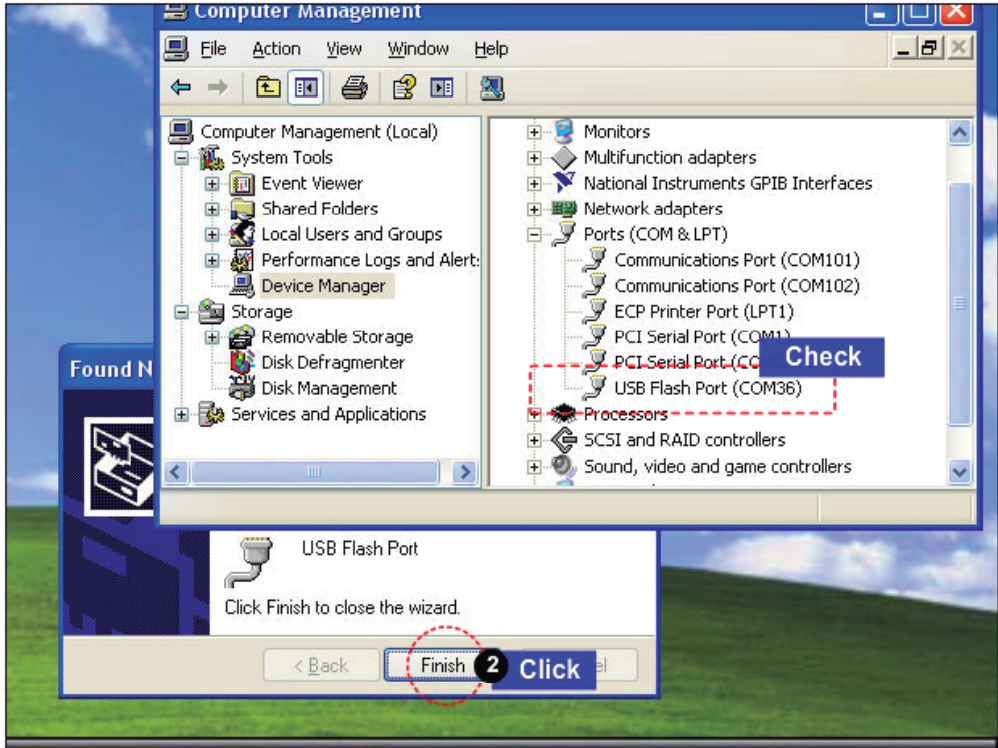
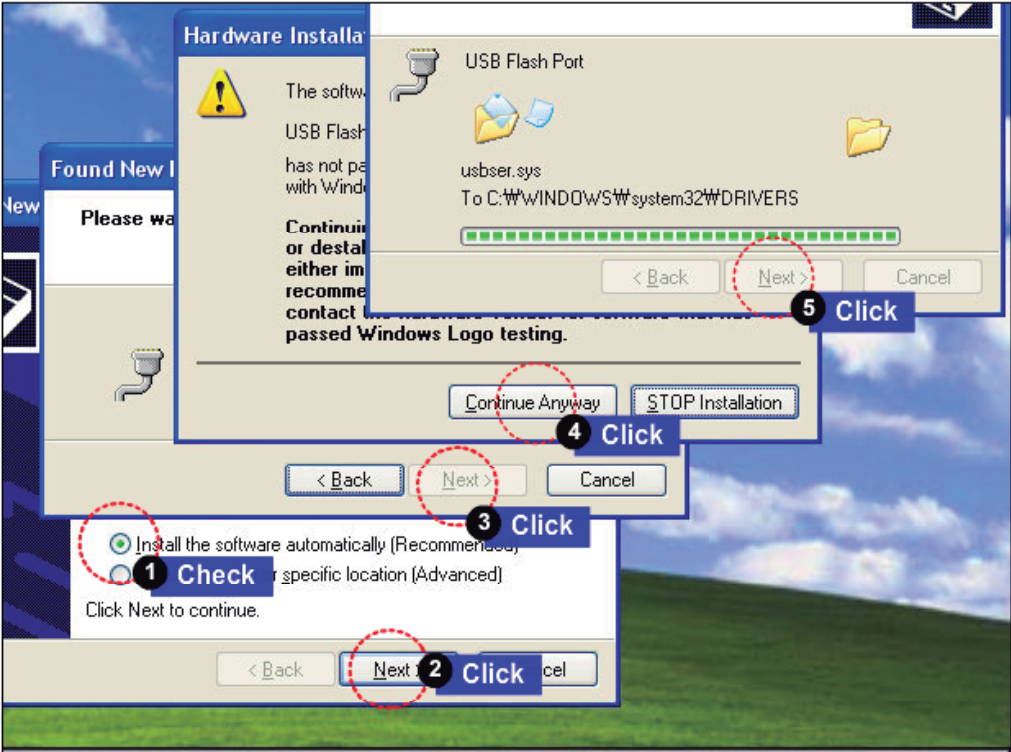


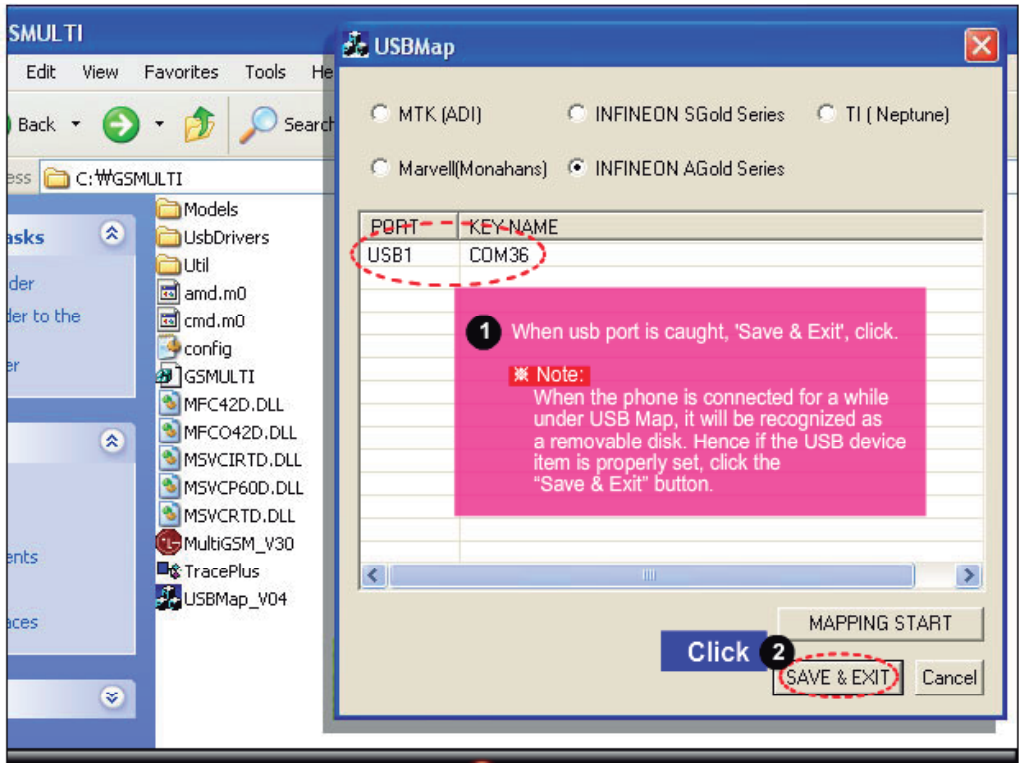
5. DOWNLOAD



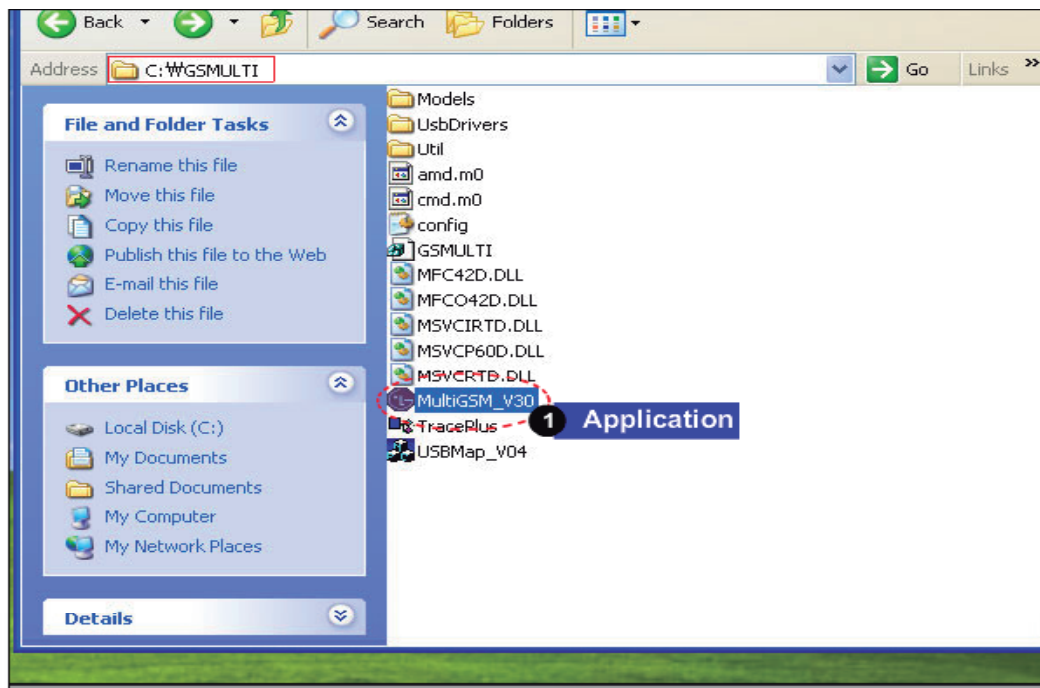
5. DOWNLOAD



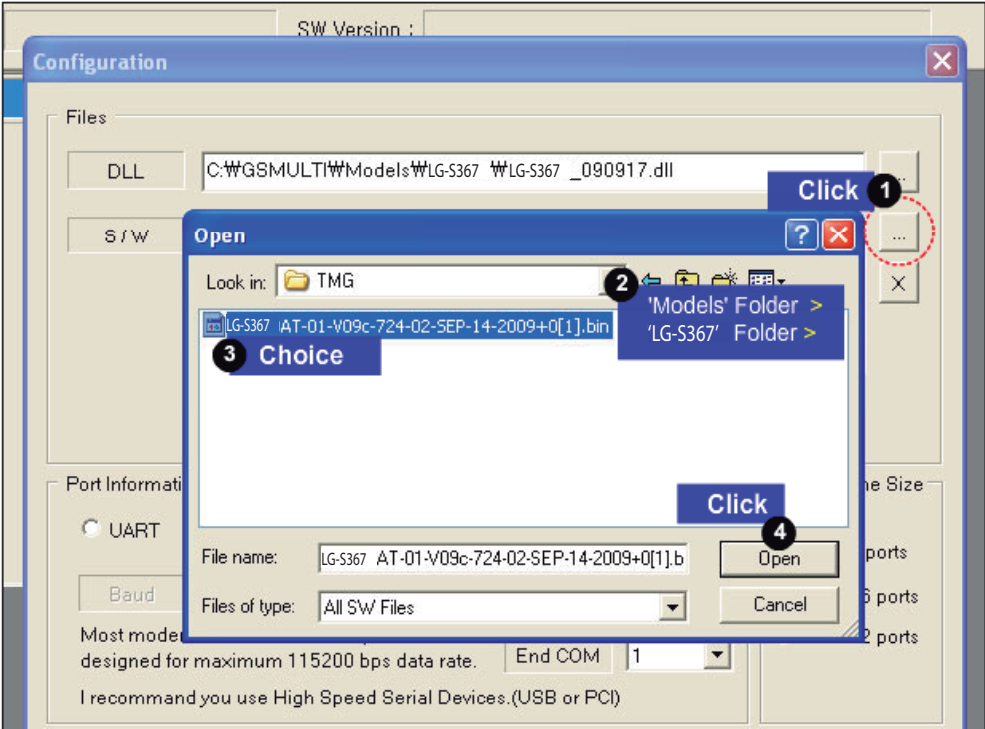
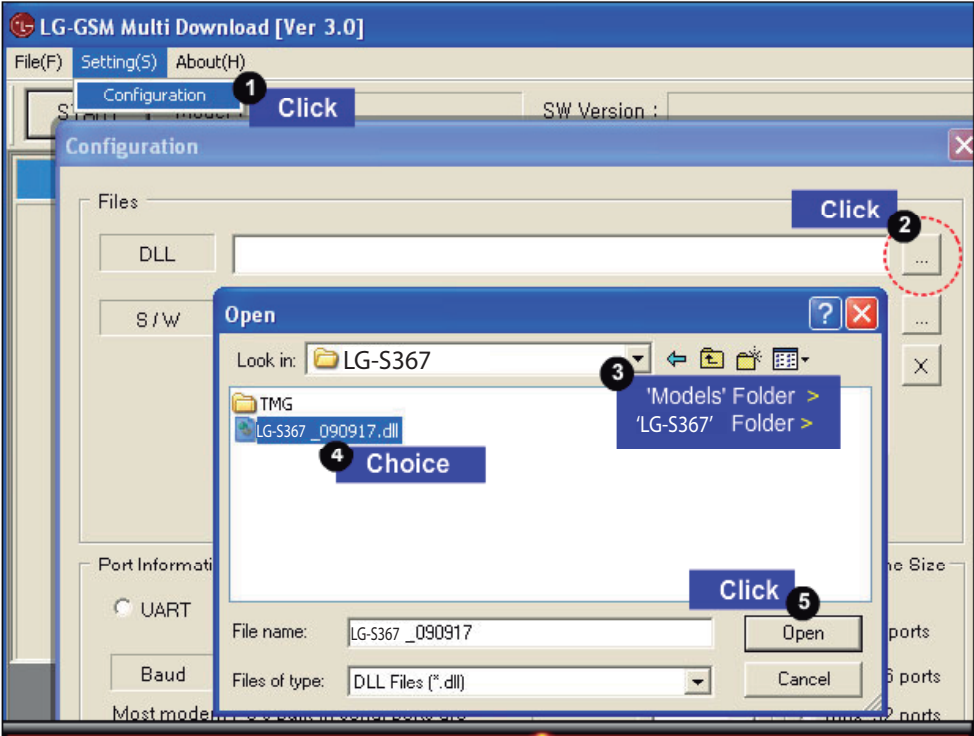




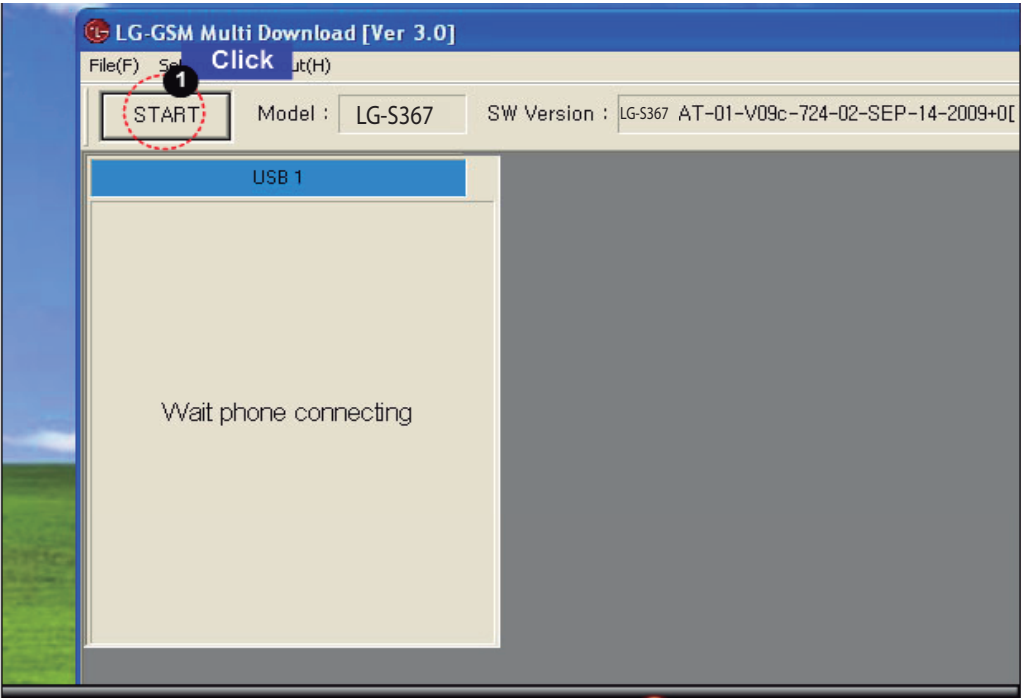
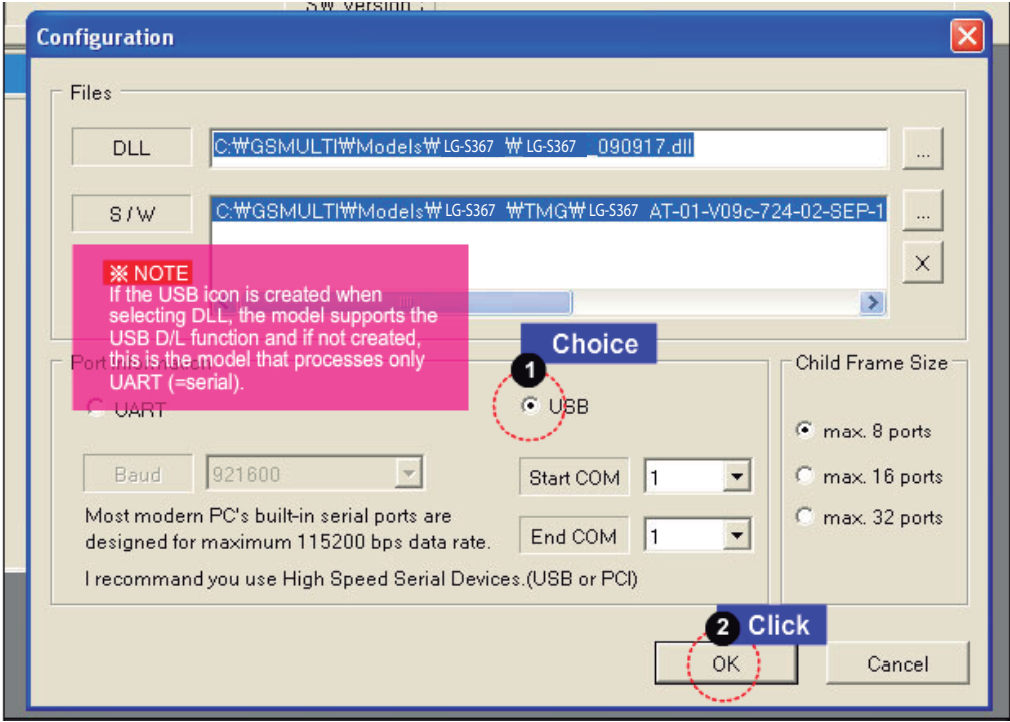
5. DOWNLOAD



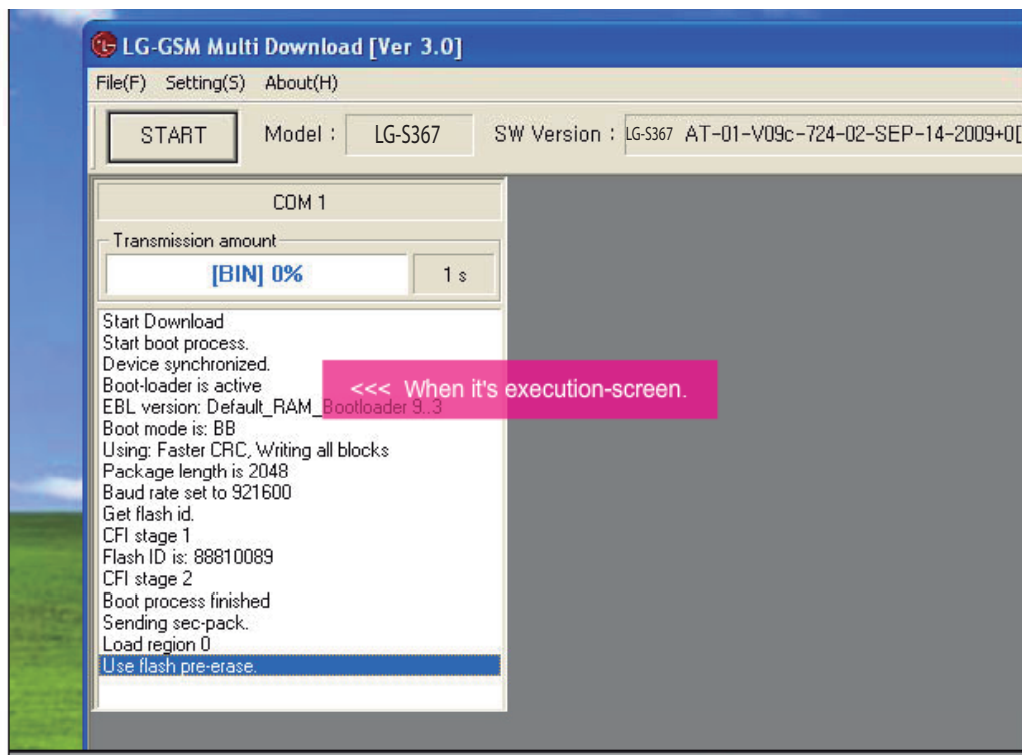
5. DOWNLOAD



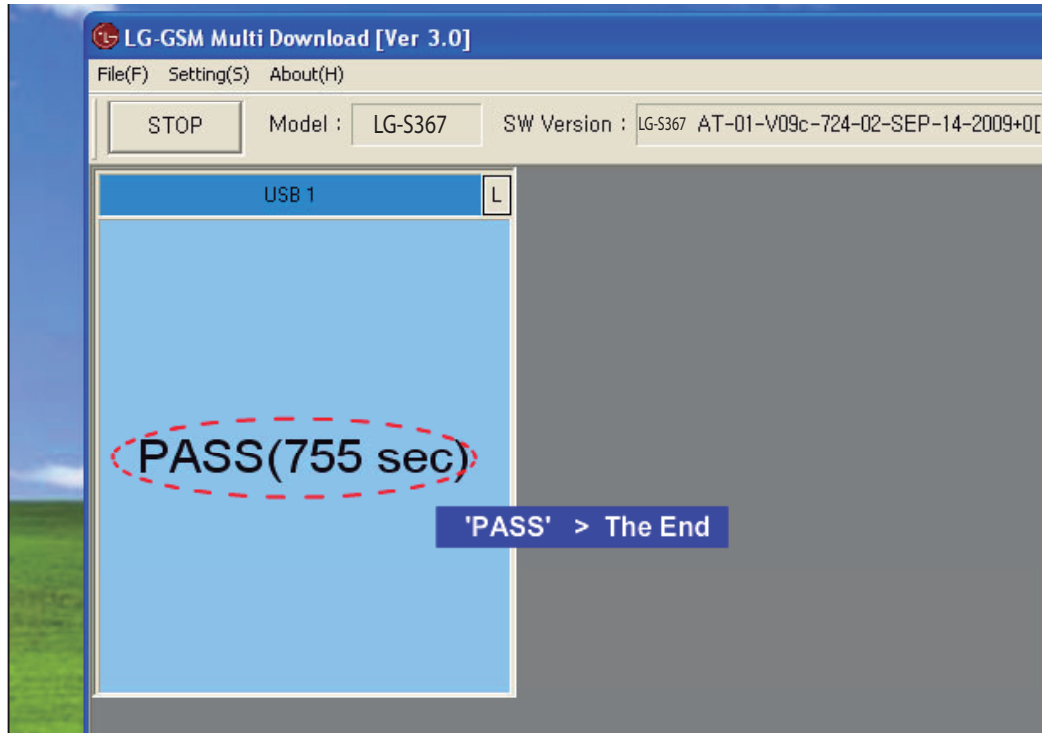
5. DOWNLOAD



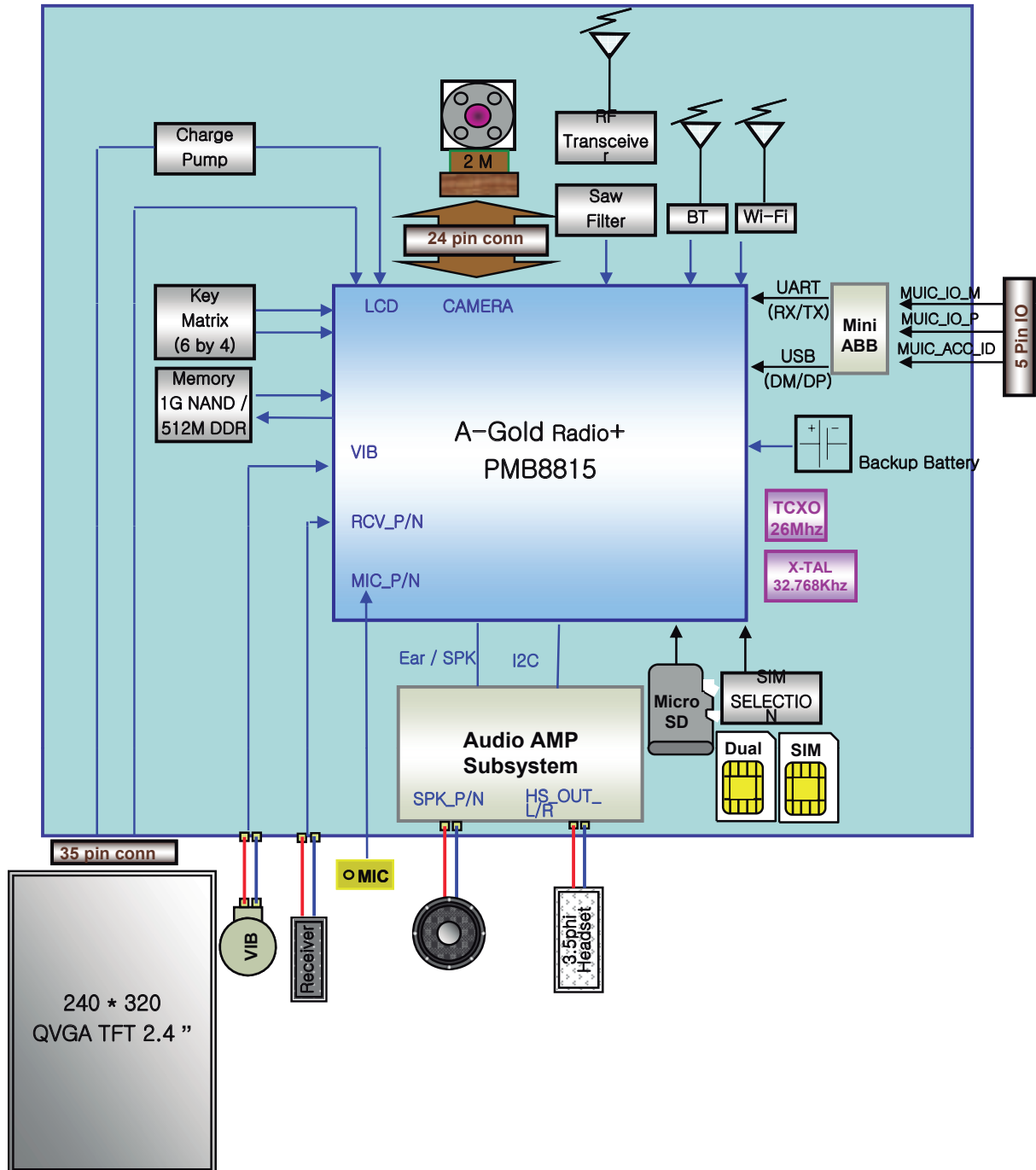
5. DOWNLOAD



5. DOWNLOAD

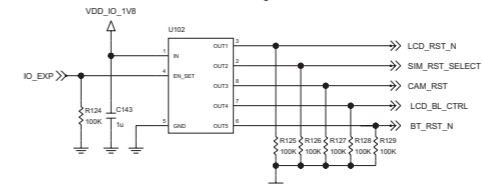
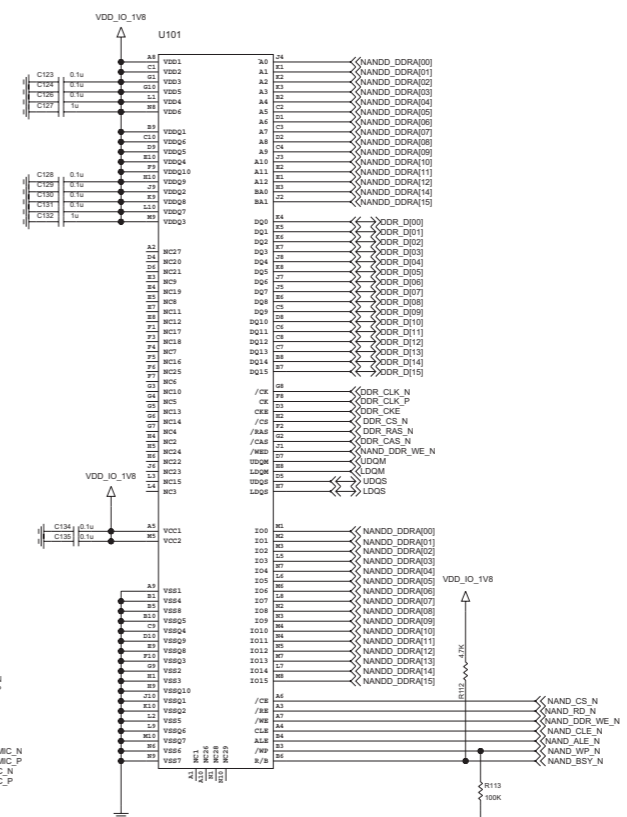
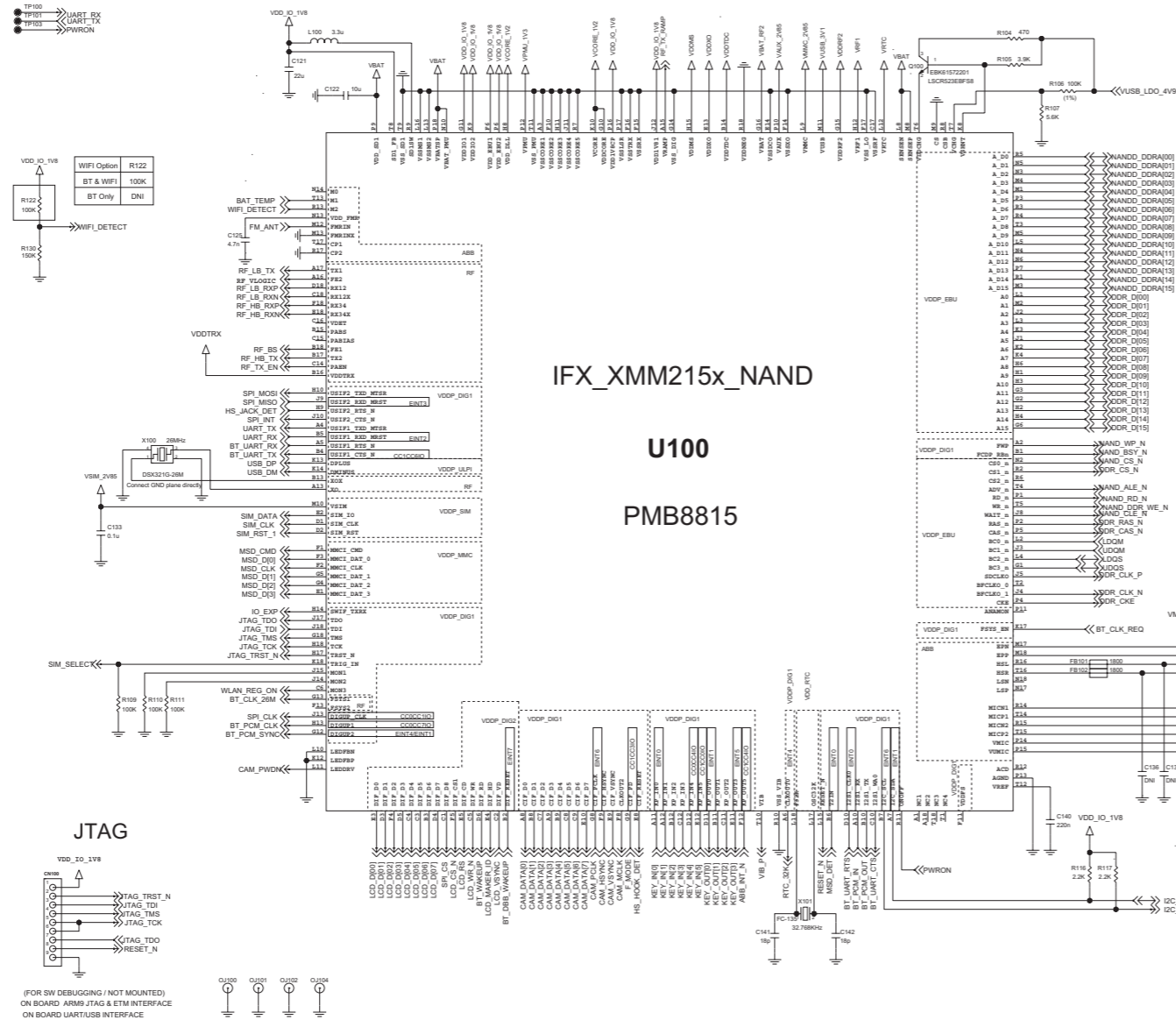
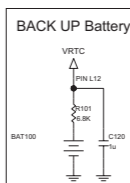
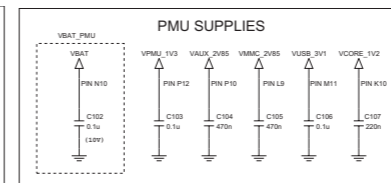
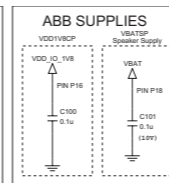
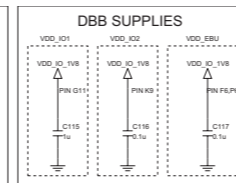
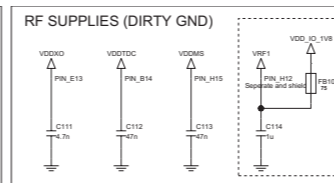
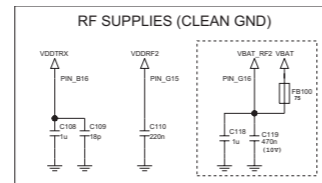
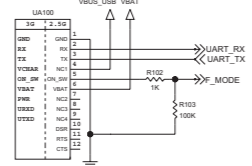


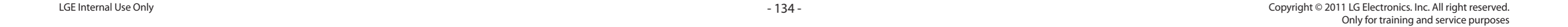
6. BLOCK DIAGRAM



7. CIRCUIT DIAGRAM

7. CIRCUIT DIAGRAM



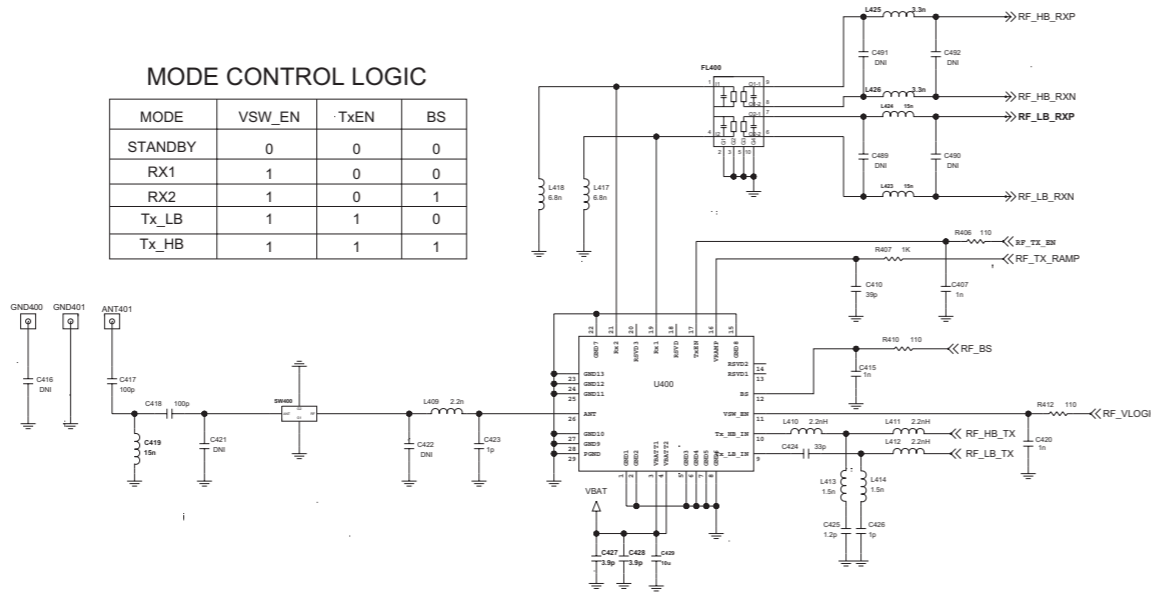


[illegible][illegible][illegible][illegible]

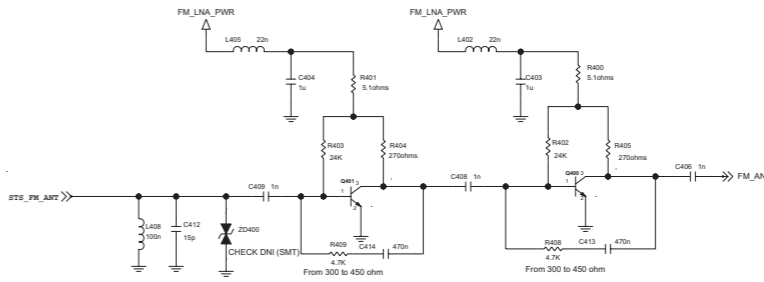
RF PART

MODE CONTROL LOGIC

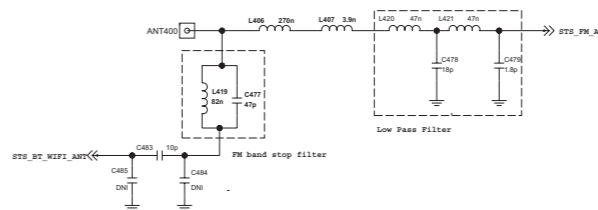
MODE	VSW_EN	TxEN	BS
STANDBY	0	0	0
RX1	1	0	0
RX2	1	0	1
Tx_LB	1	1	0
Tx_HB	1	1	1



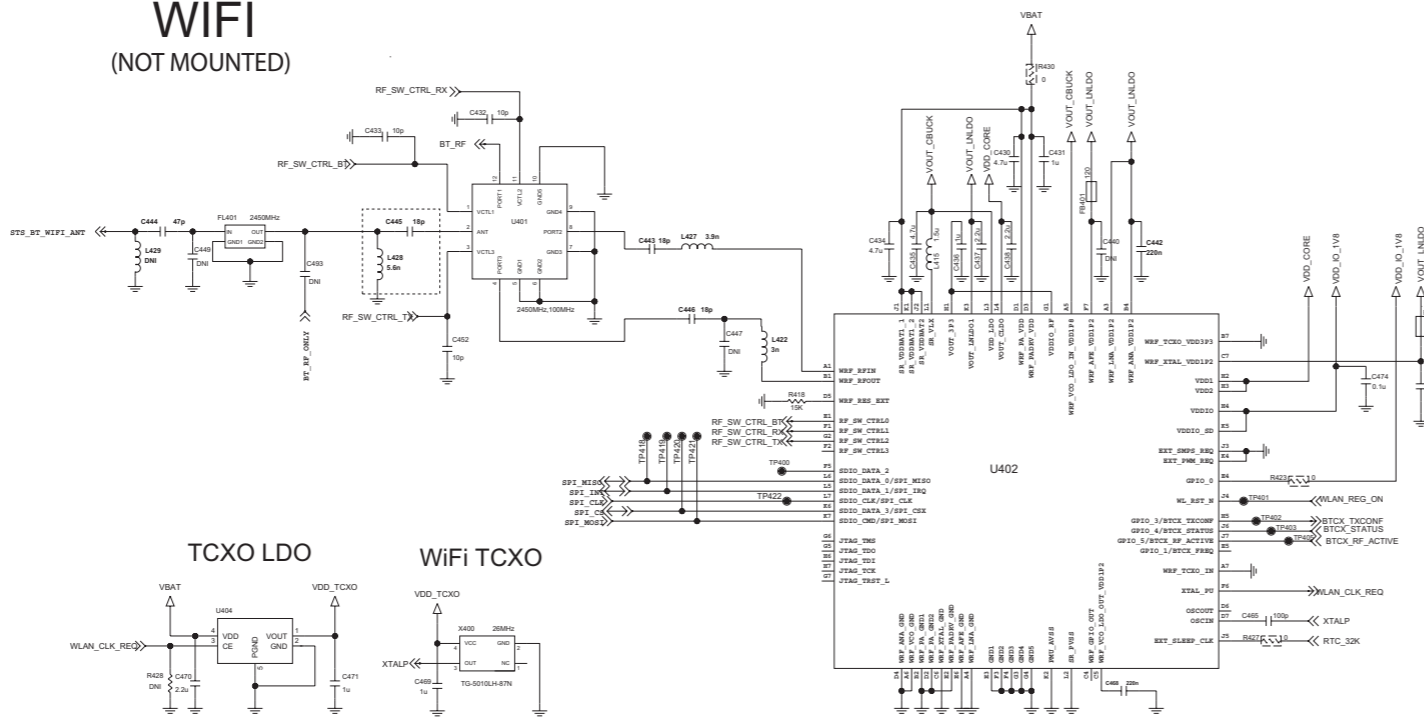
FM Radio(LNA)



Y-Splitter



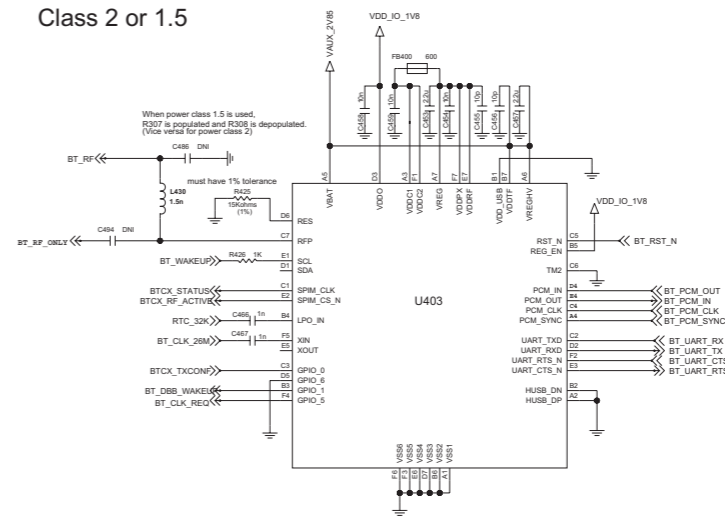
WIFI
(NOT MOUNTED)

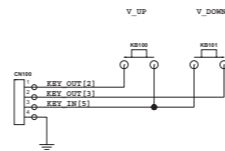


BLUETOOTH

BT only

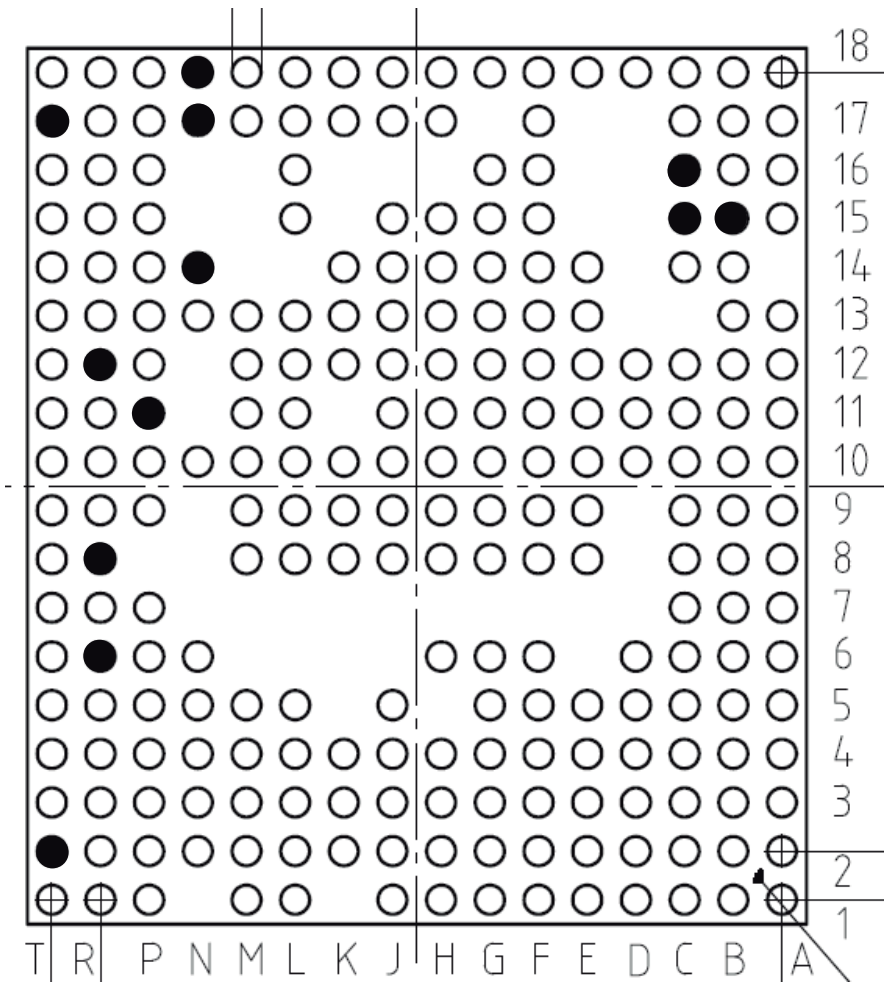
Class 2 or 1.





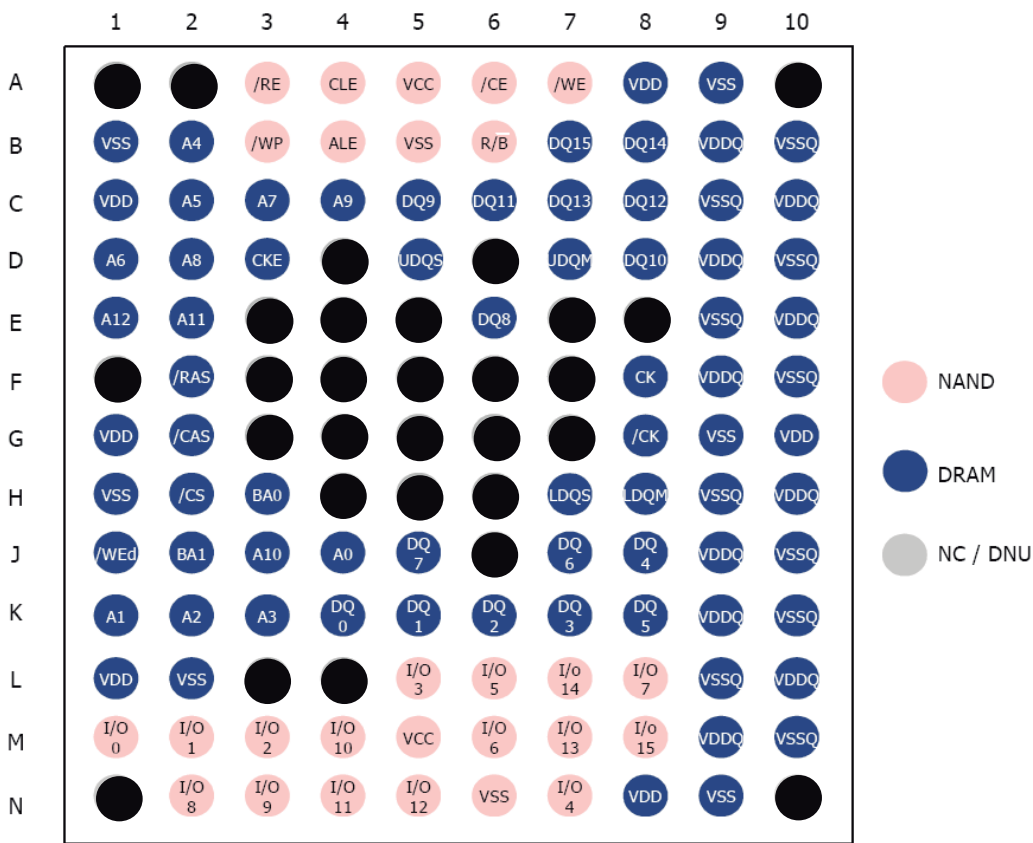
8. BGA PIN MAP

U100 (EUSY0429401, PMB8815)



● NOT USE

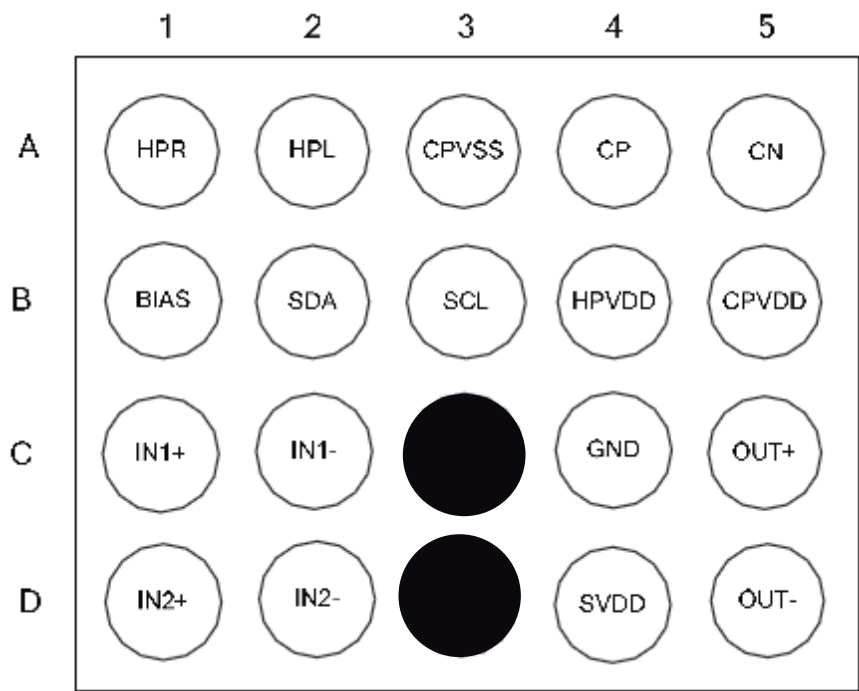
U101 (EUSY0425901, H8BCS0QG0MMR-46M)



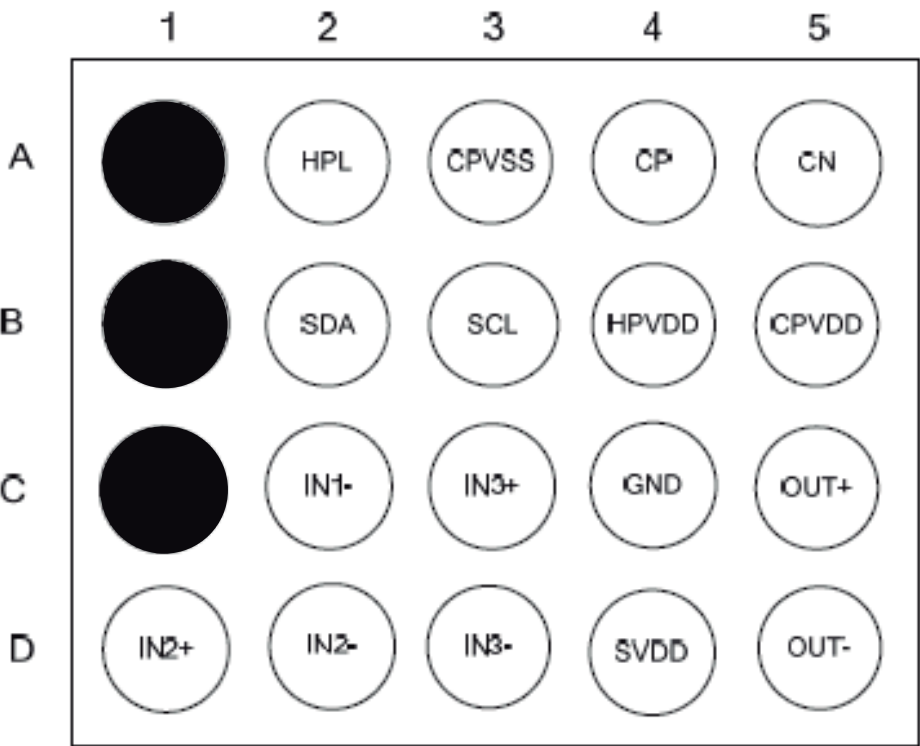
130 Ball FBGA Package (Top View)

● NOT USE

IC200 (EUSY0403901, WM9093ECS-R)

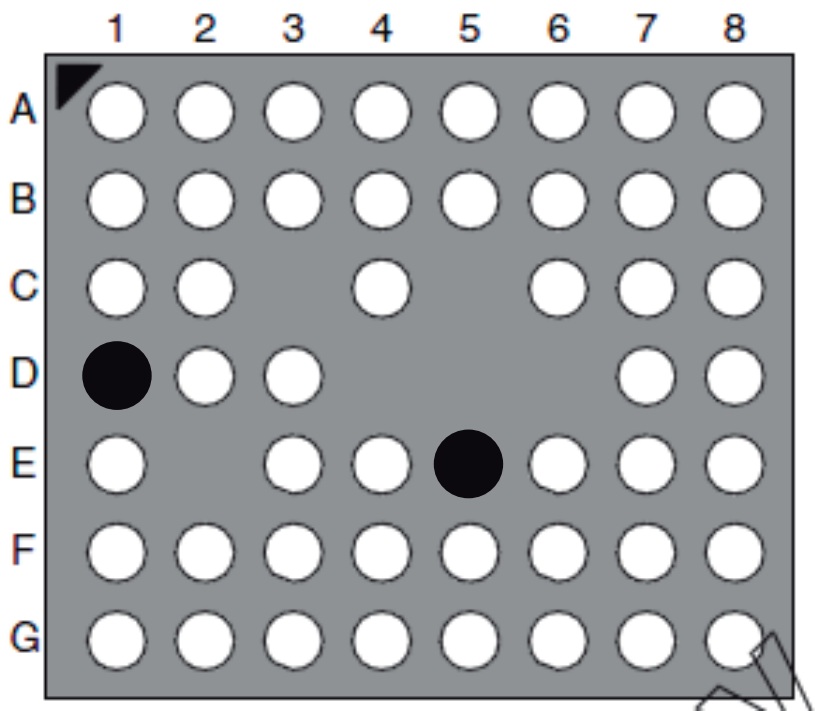


U200 (EAN61833301, LP8782)



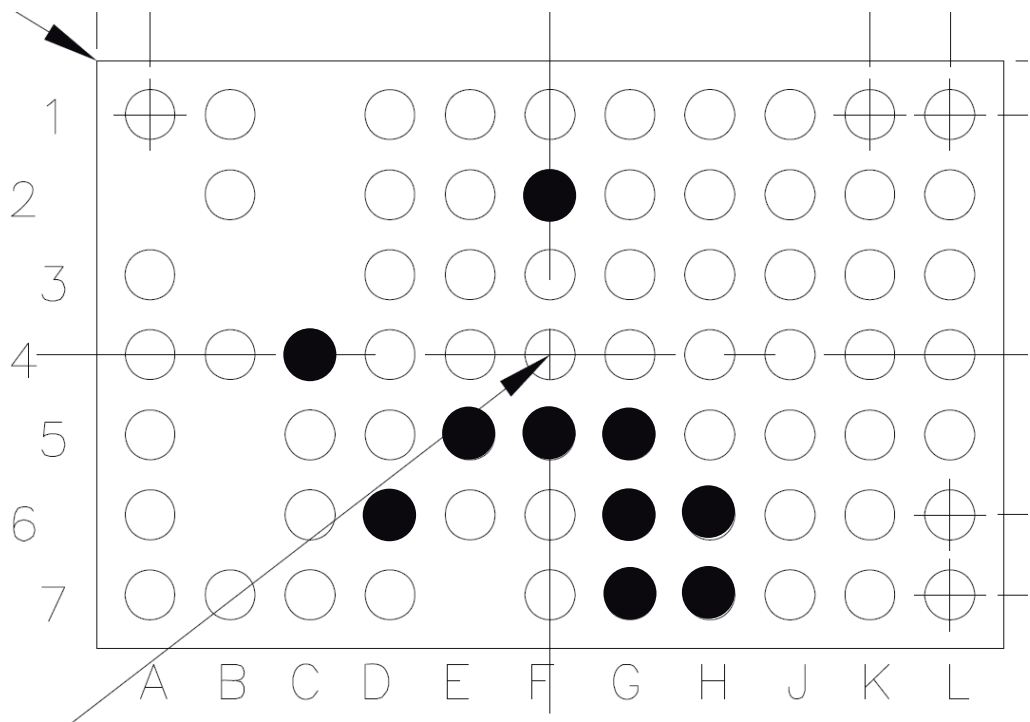
● NOT USE

U403(EUSY0418701, BCM2070CB2KUBXG)



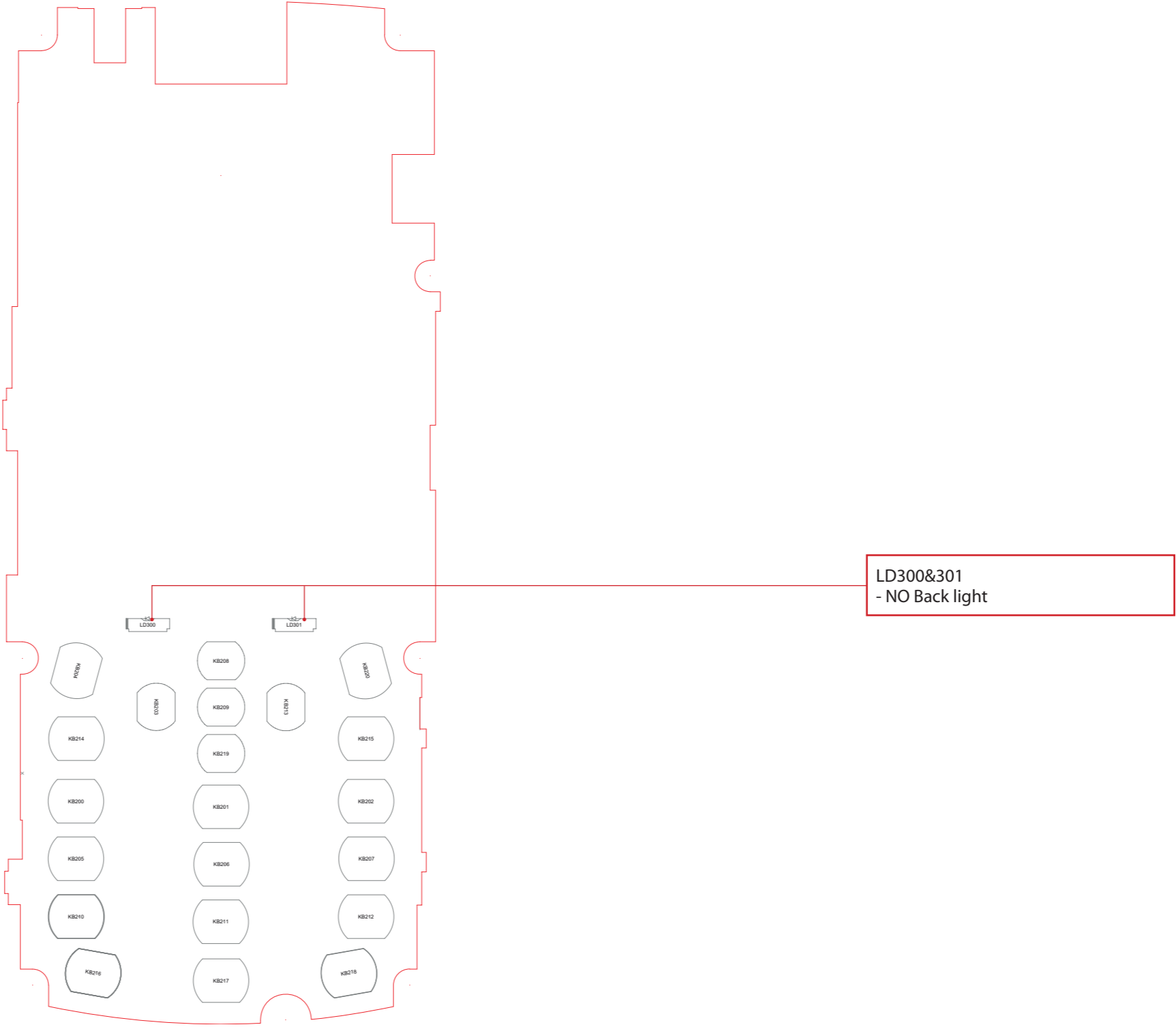
● NOT USE

U402(EUSY0434401, BCM43362)

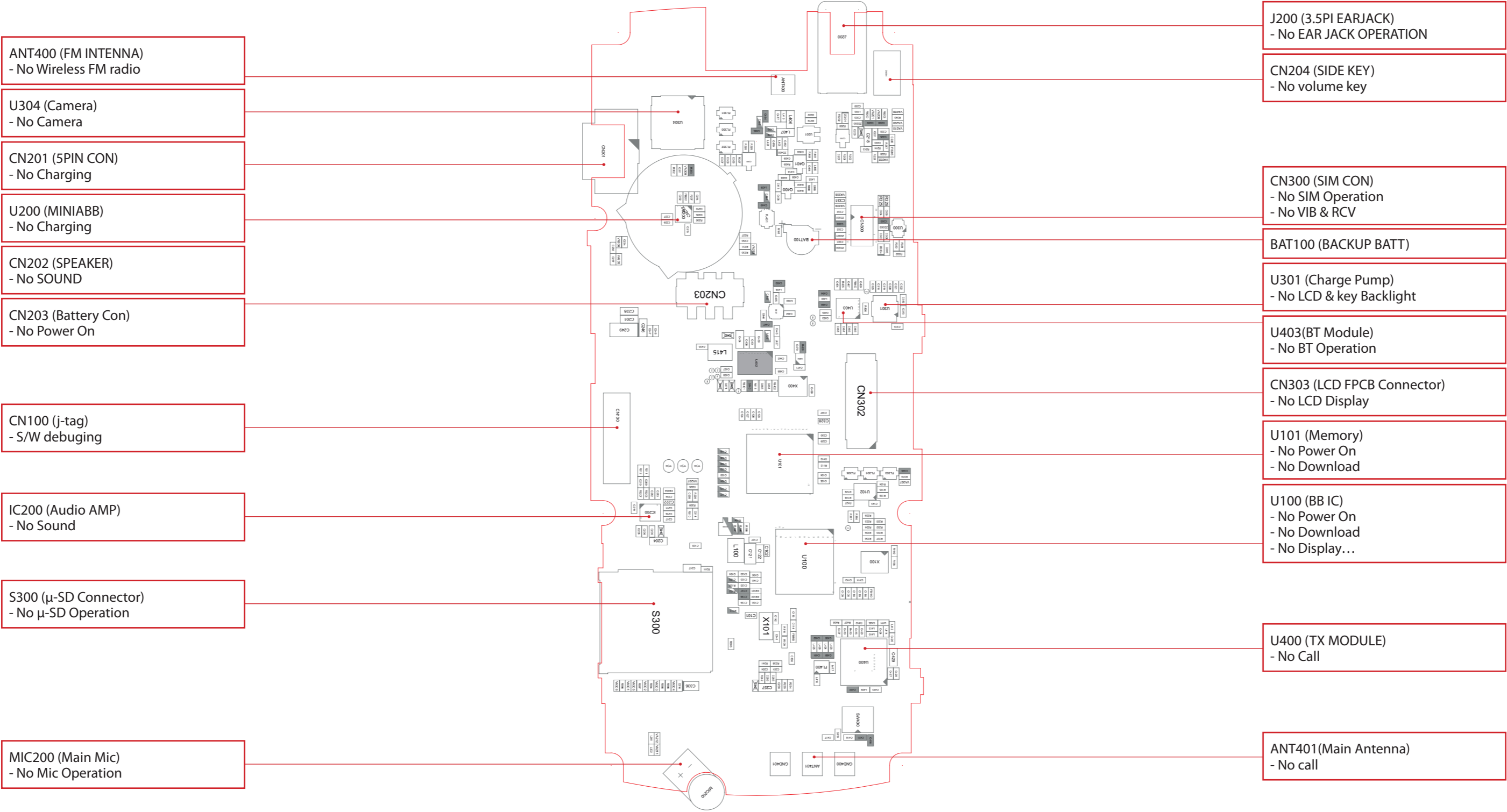


● NOT USE

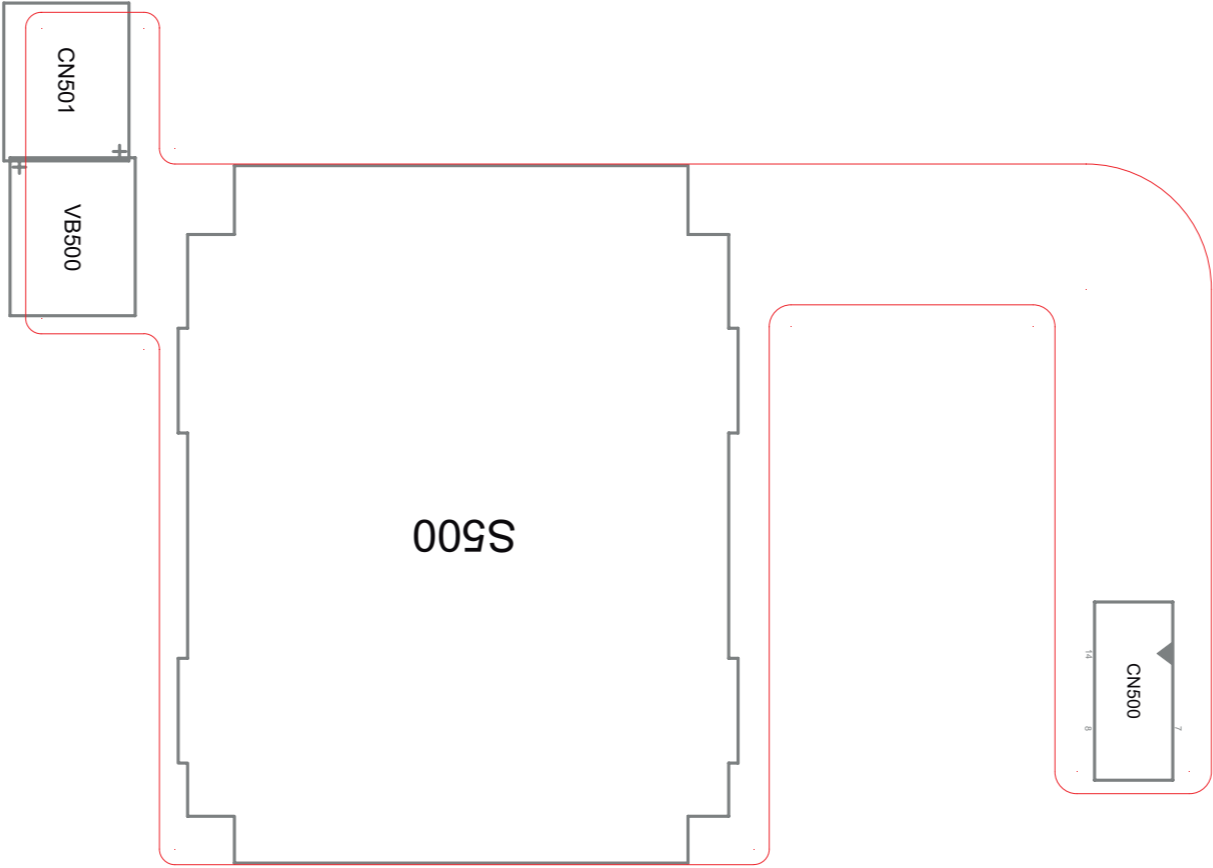
9. PCB LAYOUT



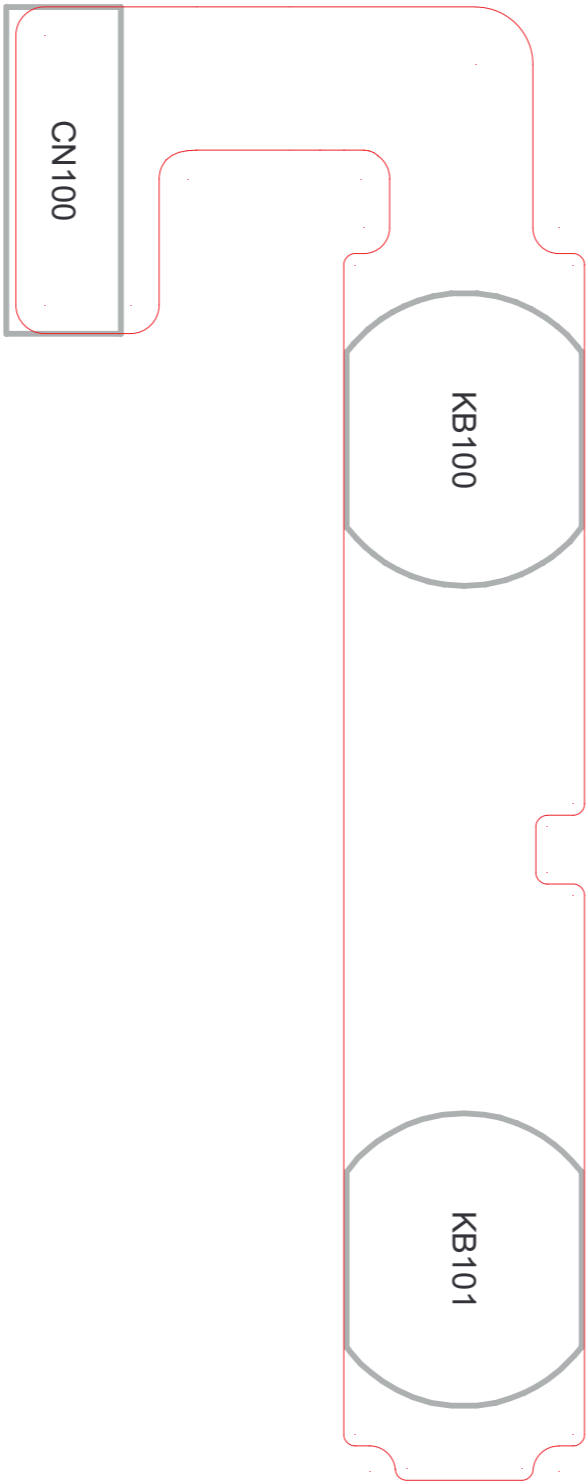
LG-S367_PCBmain_EAX64125401_1.0_TOP



LG-S367_PCBmain_EAX64125401_1.0_BOT



LG-S367_SUB_FPCB_EAX64050201-1.0-BOT



LG-S367_F_VOL_EAX64114501_1.0_TOP

10.ENGINEERING MODE

Engineering mode is designed to allow a service man/engineer to view and test the basic functions provided by a handset. The key sequence for switching the engineering mode on is "3845#*367# "Select. Pressing END will switch back to non-engineering mode operation. Use Up and Down key to select a menu and press 'select' key to progress the test. Pressing 'back key will switch back to the original test menu.

[1] BB TEST

[1-1] Battery Info

[1-1-1] BattInfo

[1-2] Bluetooth Test

[1-2-1] Enter Test Mode

[1-2-2] OnOff Test

[1-2-3] Headset Test

[1-2-4] BT Test1

[1-2-5] BT Test2

[1-2-6] Xhtml Compose Print

[1-2-7] Xhtml Print Test

[2] Model Version

[2-1] Version

[3] Eng Mode

[3-1] Cell environ.

[3-2] PS Layer Info

[3-2-1] Mobility

[3-2-2] RadioRes

[3-2-1] Gprs

[3-3] Layer1 Info

[3-4] Reset Information

[3-5] Memory Configuraron

[3-6] MemGenConf

[3-7] MemAllUse

[3-8] MemDetUse

[3-9] MemDump

[3-10] Change Frequency Band

[4] Call Timer

[5] Factory Reset

[6] MF TEST

[6-1] All Auto Test

[6-2] Backlight

[6-2-1] BacklightOn

[6-2-2] BacklightOff

[6-3] Audio

[6-3-1] Audio Test

[6-4] Vibrator

[6-4-1] VibratorOn

[6-4-2] VibratorOff

[6-5] LCD

[6-5-1] Auto LCD

[6-6] Key pad

[6-7] Mic Speaker

[6-8] Camera

[6-8-1] Camera Main Preview

[6-8-2] FlashOn

[6-8-3] FlashOff

[6-8-4] CameraFlashBunning

[6-9] FM Radio

[6-9-1] FM Radio Test

[7] Network selection

[7-1] Automatic

[7-2] GSM850

[7-3] EGSM

[7-4] DCS

[7-5] PCS

11. STAND ALONE TEST

11.1 Introduction

This manual explains how to examine the status of RX and TX of the model.

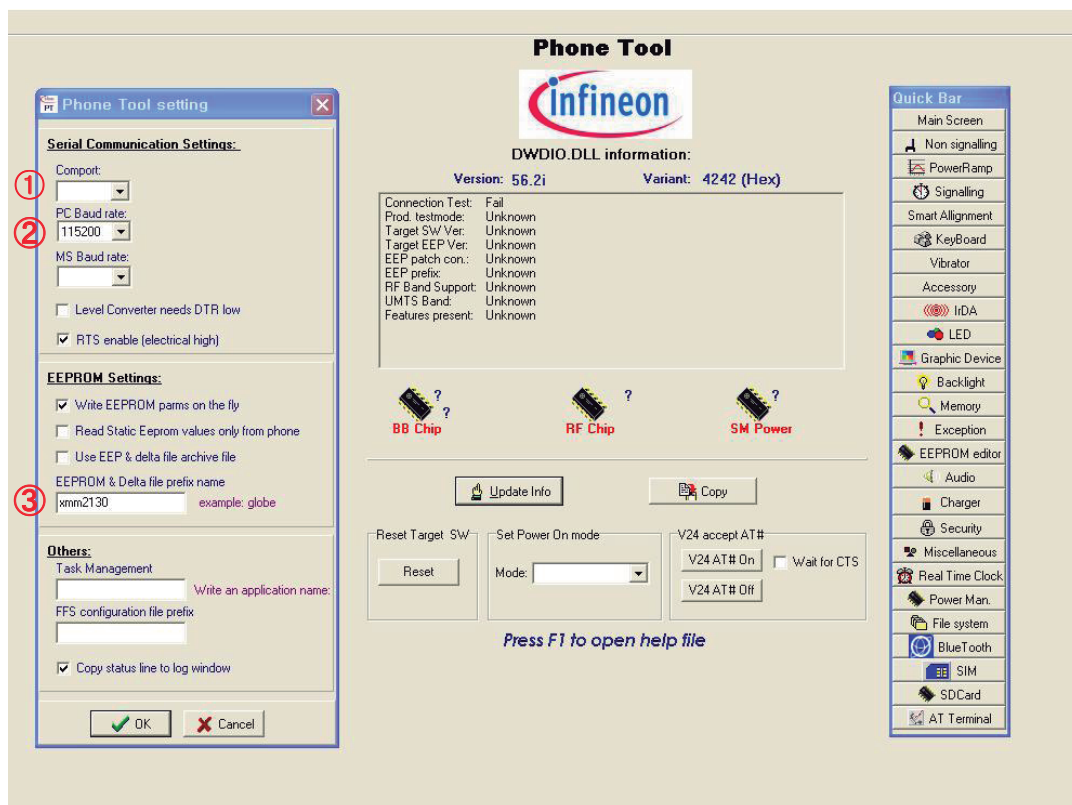
A. Tx Test

TX test - this is to see if the transmitter of the phones is activating normally.

B. Rx Test

RX test - this is to see if the receiver of the phones is activating normally.

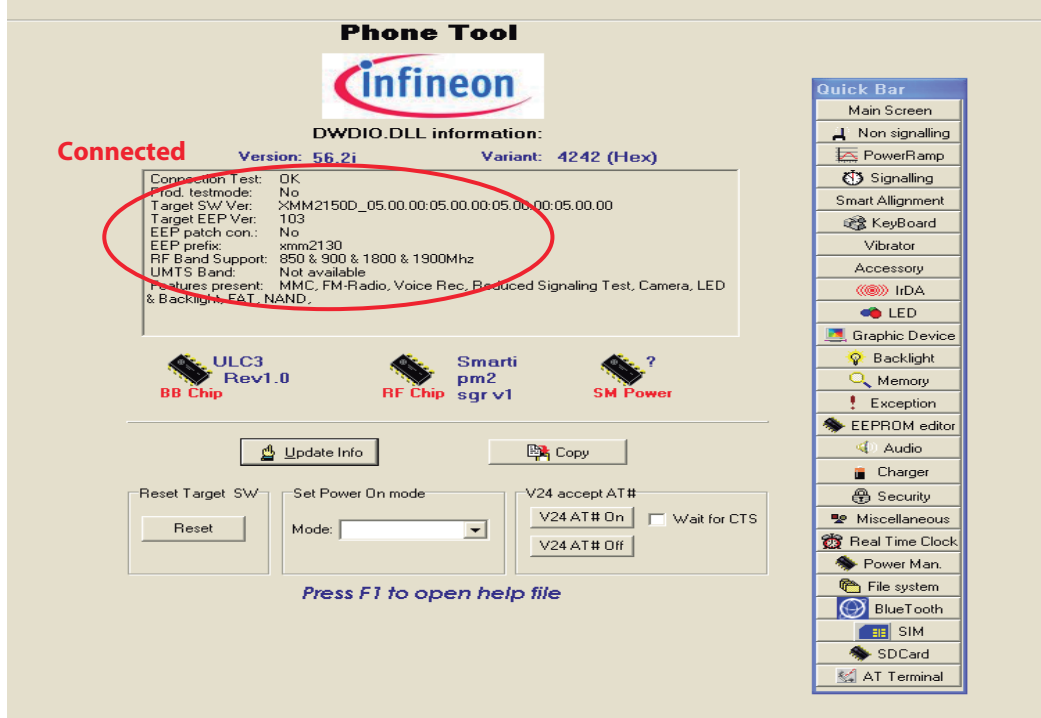
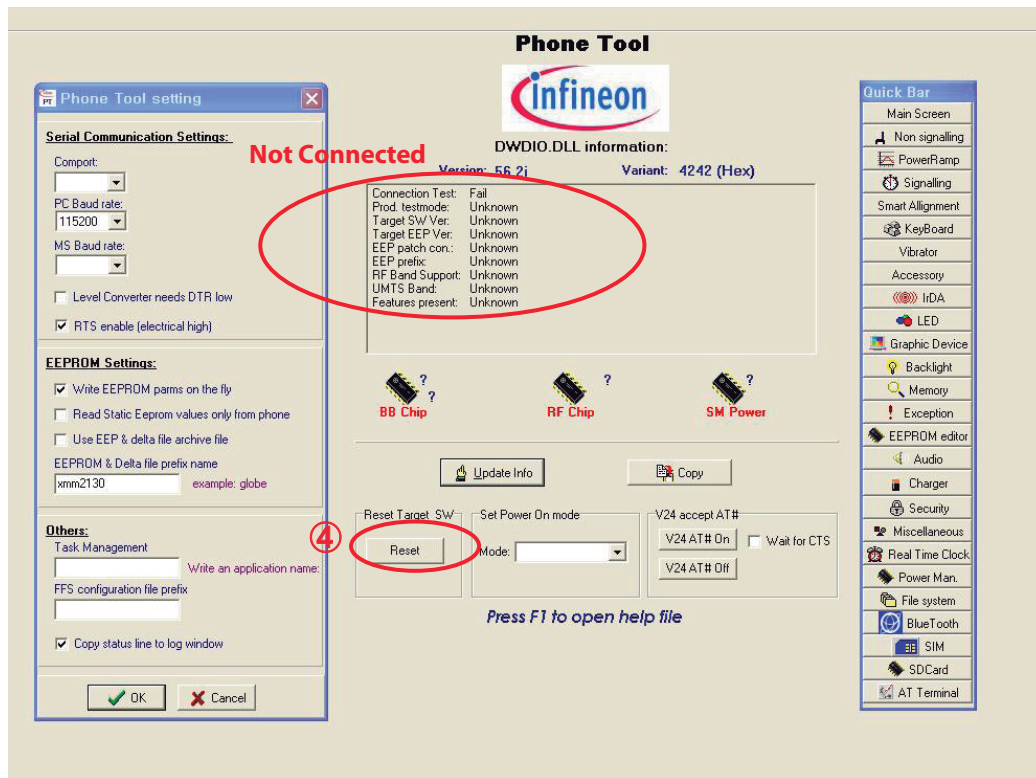
11.2 Setting Method



1. Set COM Port
2. Check PC Baud Rate
3. Confirm EEPROM & Delta file prefix name

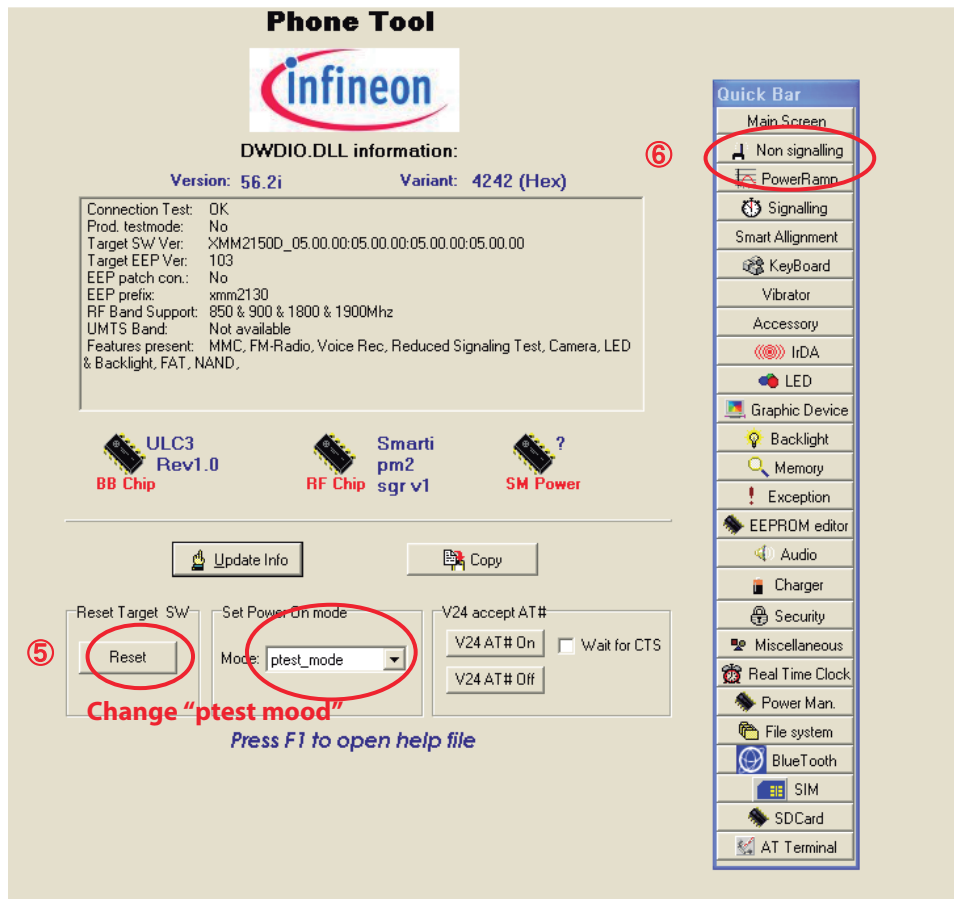
11. STAND ALONE TEST

4. Click "Update Info" for communicating Phone and Test-Program

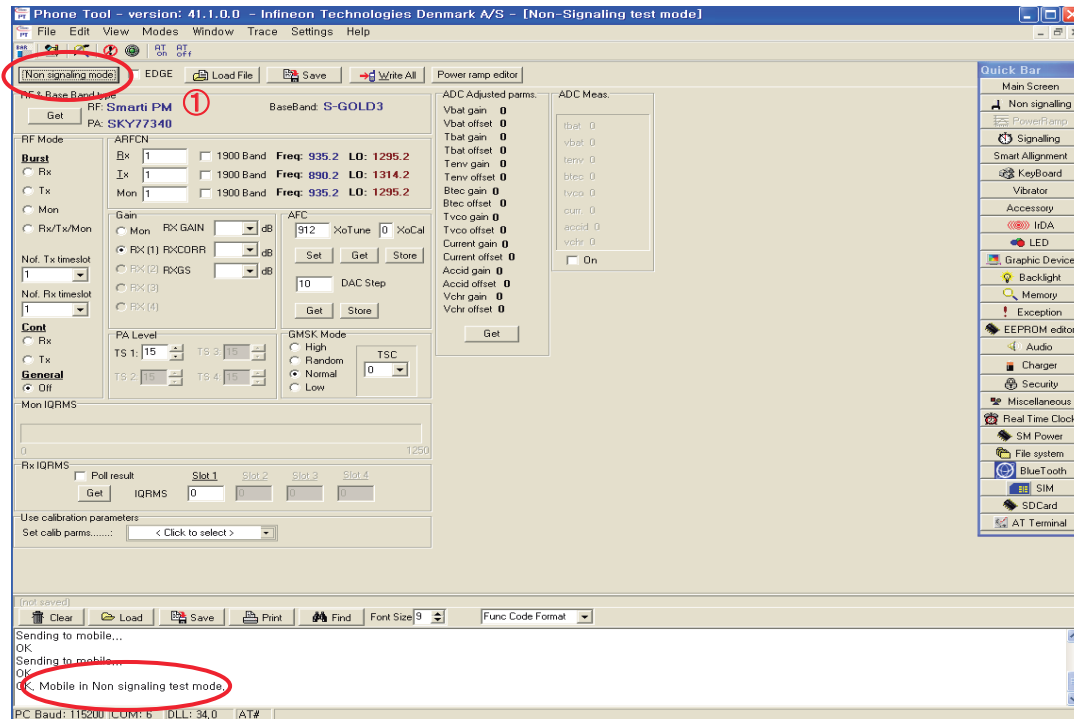


11. STAND ALONE TEST

5. For the purpose of the Standalone Test, Change the Phone to "ptest mode" and then Click the "Reset" bar.
6. Select "Non signaling" in the Quick Bar menu. Then Standalone Test setup is finished.



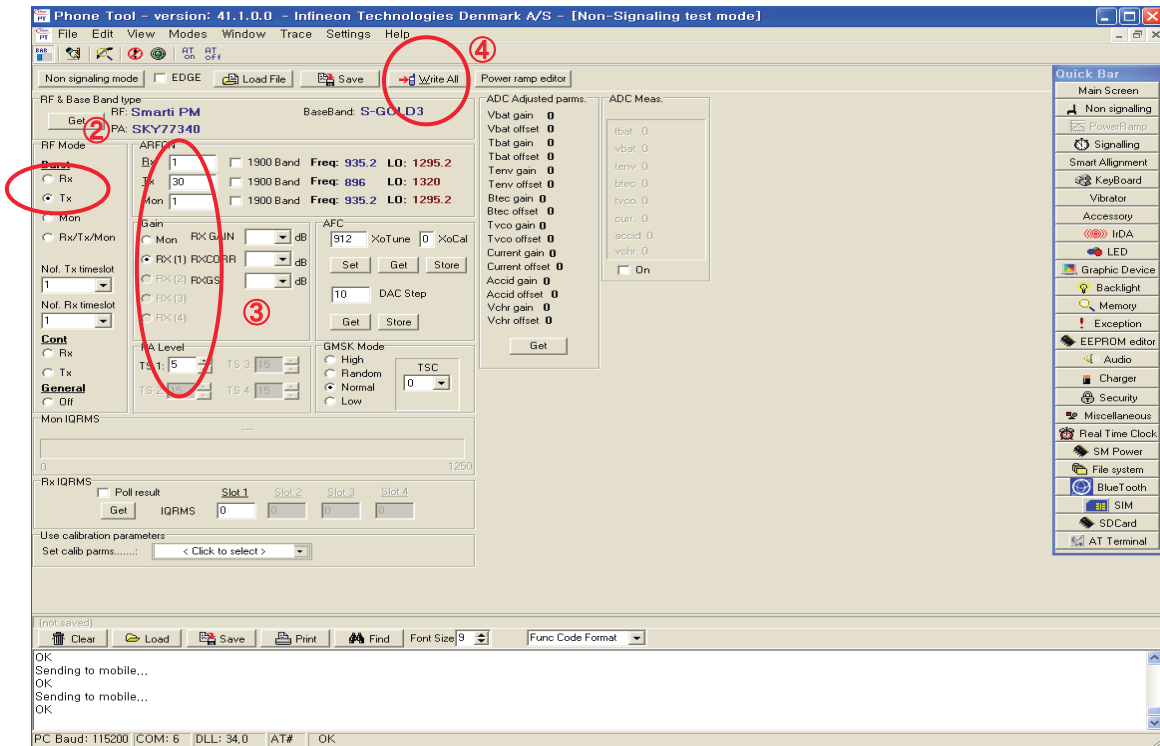
11.3 Tx Test



1. "Non signaling mode" bar and then confirm "OK" text in the command line.

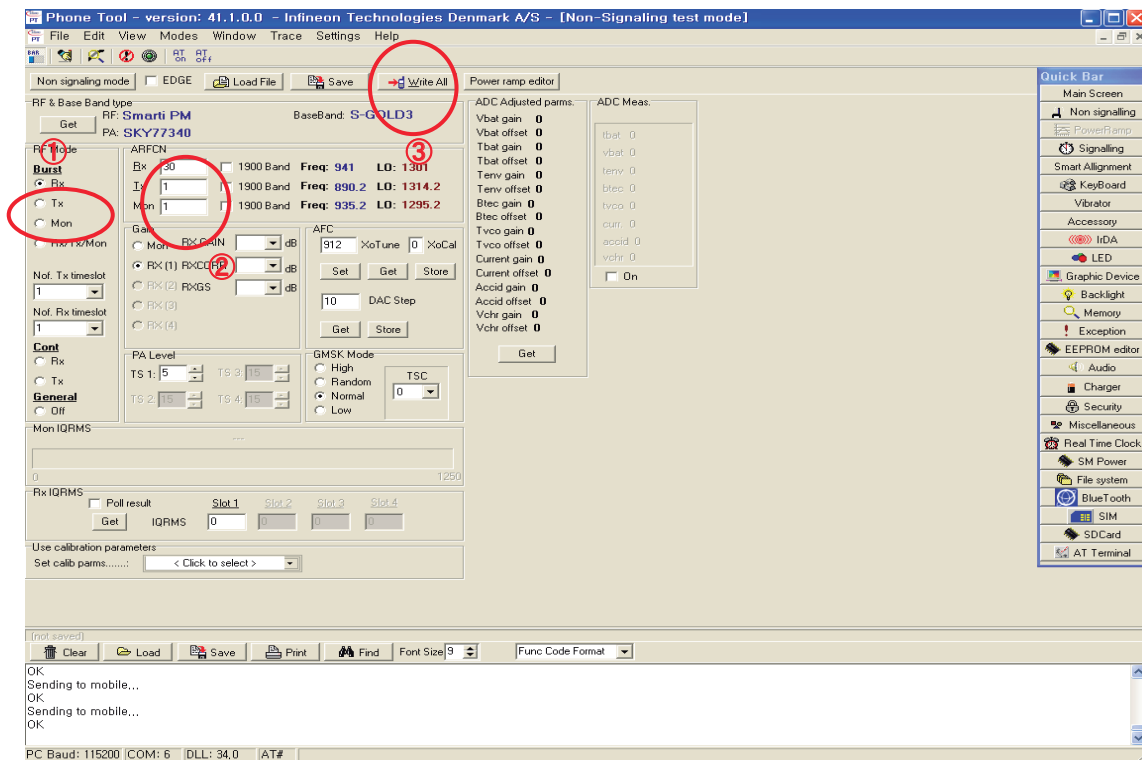
11. STAND ALONE TEST

2. Put the number of TX Channel in the ARFCN
3. Select "Tx" in the RF mode menu and "PCL" in the PA Level menu.
4. Finally, Click "Write All" bar and try the efficiency test of Phone.



11.4 Rx Test

1. Put the number of RX Channel in the ARFCN.
2. Select "Rx" in the RF mode menu.
3. Finally, Click "Write All" bar and try the efficiency test of Phone.



12. AUTO CALIBRATION

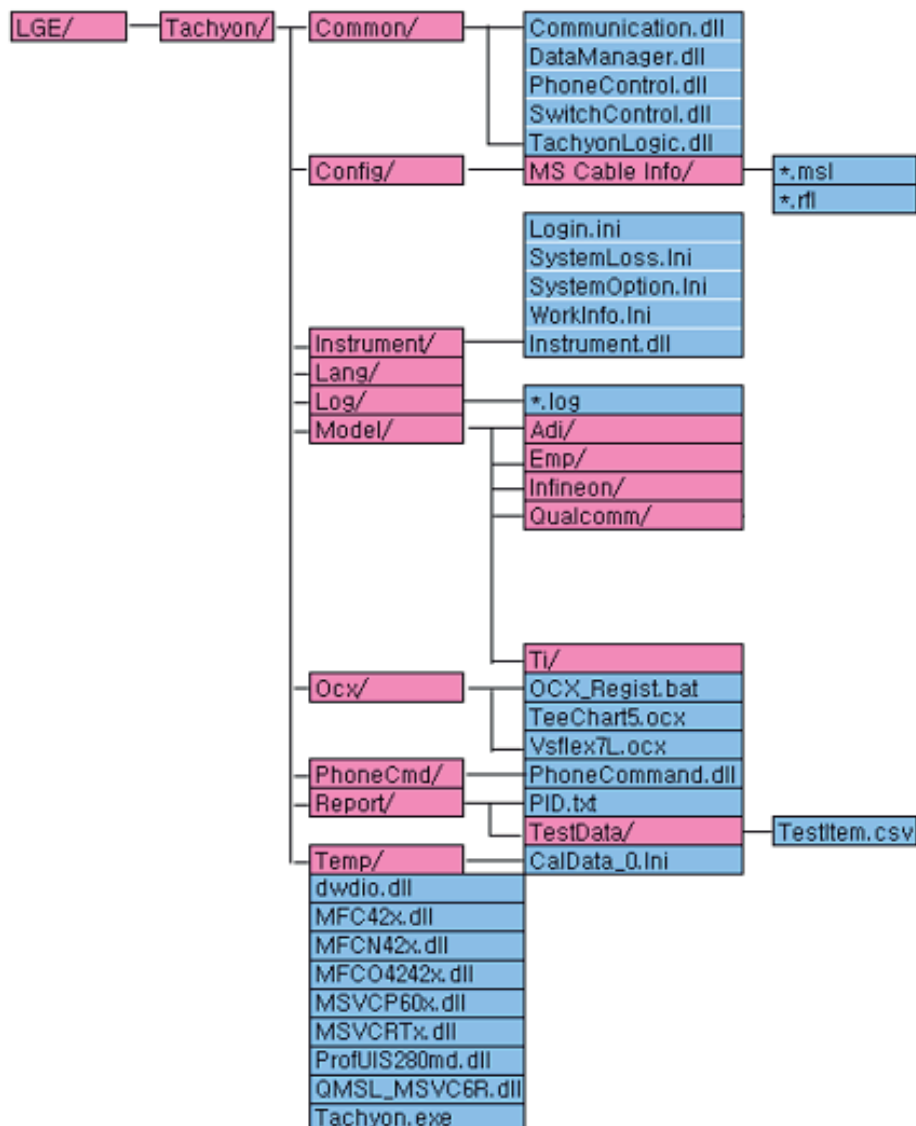
12.1 Overview

Auto-cal (Auto Calibration) is the PC side Calibration tool that perform Tx, Rx and Battery Calibration with Agilent 8960(GSM call setting instrument) and Tektronix PS2521G (Programmable Power supply).

Auto-cal generates calibration data by communicating with phone and measuring equipment then write it into calibration data block of flash memory in GSM phone.

12.2 Configuration of Tachyon

"CWLGEWTachyon"



12.3 Description of Folder & File.

12.3.1 Folder Explain

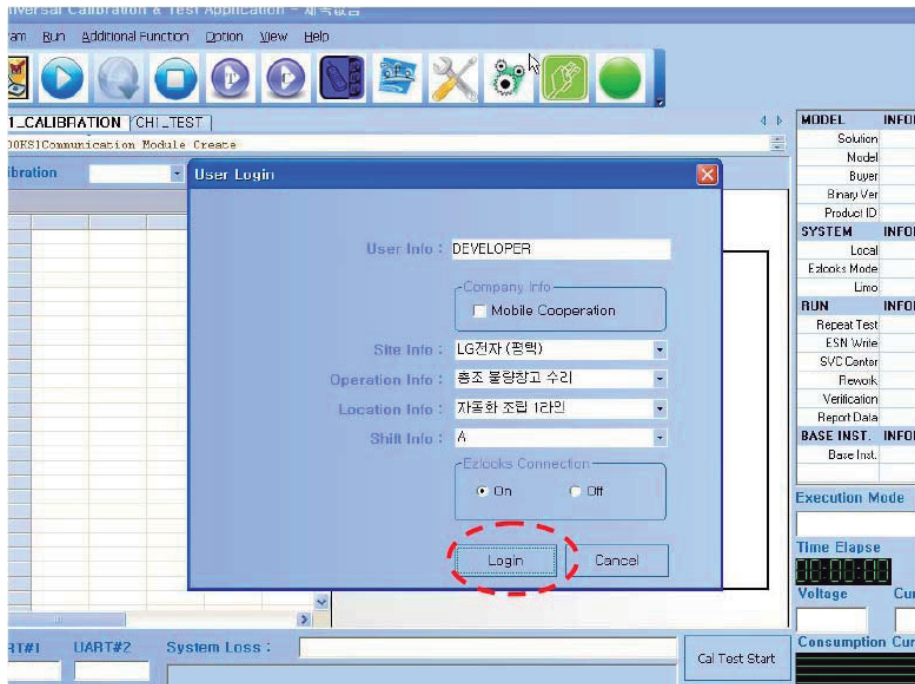
- **Tachyon** : exist tachyon execute file, dll for MFC, dll for UI
- **Common** : common files(XML Data I/O , Auto Test Logic, Tachyon Logic Control), dll for communication with system.
- **Config** : *.ini configuration files for port setting and cable loss.
- **Model** : configuration files for each model.
- **OCX** : component files for Tachyon.
- **PhoneCmd** : files for communication with phone.
- **Report** : test result files.
- **Temp** : store calibration value.

11.3.2 File Explain

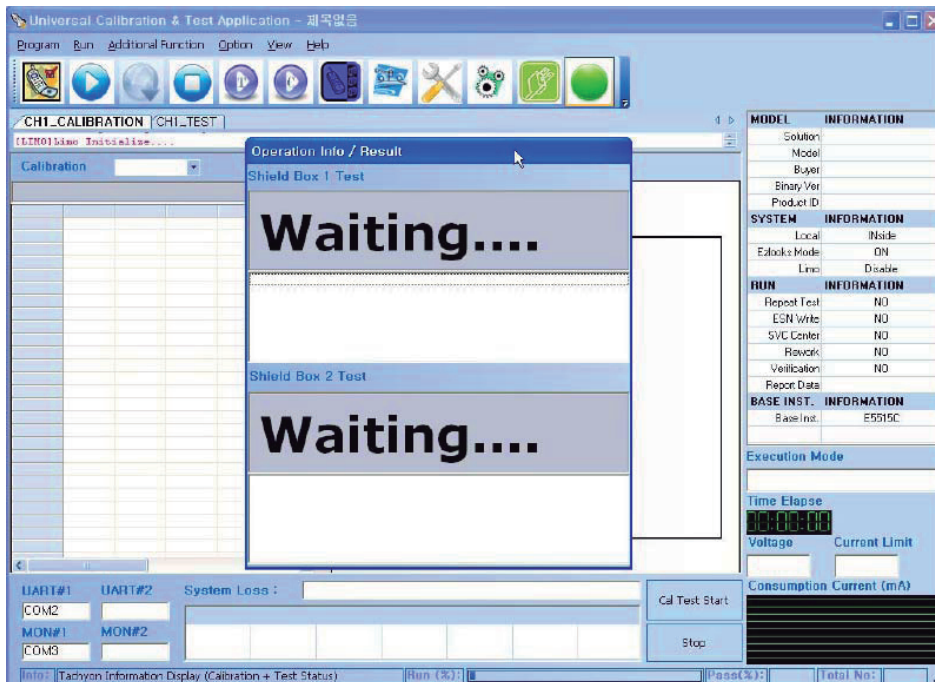
- **Model_Calibration.xml** : stored data for calibration.
- **Model_CallSetuo.xml** : stored equipment setting data for auto test.
- **Model_NV.ini** : default NV data.
- **Model_Sequence.xml** : stored calibration and auto test procedure.

12.4 Procedure

1. Execute “/LGE/Tachyon/Tachyon.Exe” and Click Login button.



2. Tachyon execute ready display



12.5 Tachyon Main UI

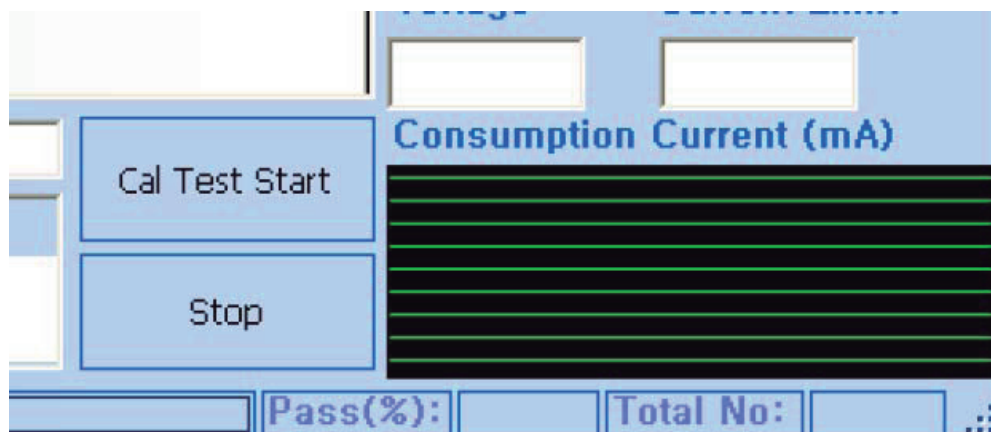
12.5.1 Tool bar



1. Model Selection
2. Calibration + Test
3. Not Support
4. Stop
5. Test Only
6. Calibration Only
7. Phone Control
8. Loss Adjustment
9. System Option
10. Run Option
11. Voltage / Current Setting
12. Show Result

12.5.2 Command button

Only support Calibration Test and Stop button.



12.6 AGC

This procedure is for Rx calibration.

In this procedure, We can get RSSI correction value. Set band EGSM and press Start button the result window will show correction values per every power level and gain code and the same measure is performed per every frequency.

12.7 APC

This procedure is for Tx calibration.

In this procedure you can get proper scale factor value and measured power level.

12.8 ADC

This procedure is for battery calibration.

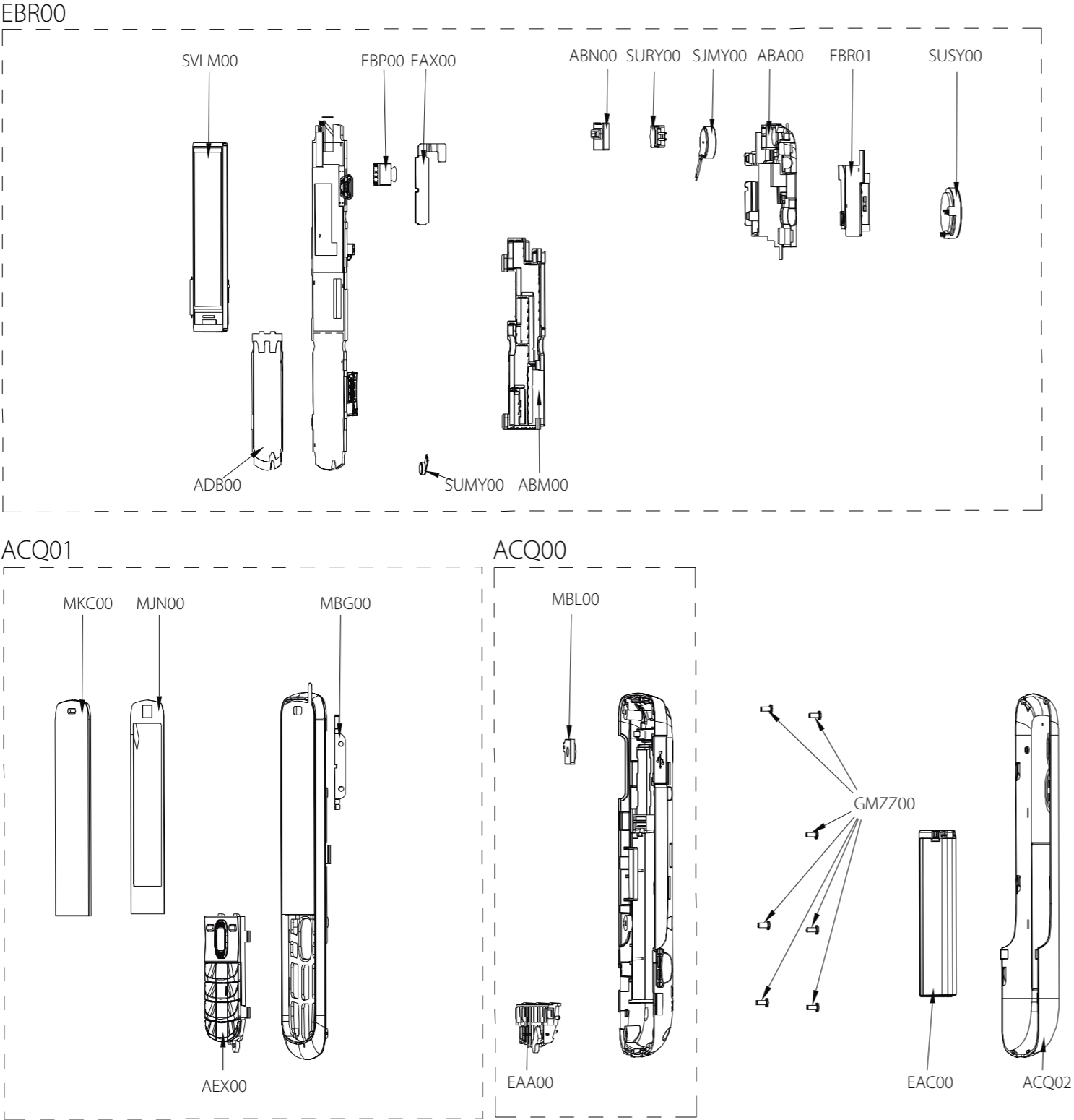
You can get main Battery Config Table and temperature Config Table will be reset.

12.9 Target Power

BAND	Description	Low	Middle	High
GSM 850	Channel	128	191	251
	Frequency	824.2 MHz	836.8 MHz	848.8 MHz
	Max power	32.5 dBm	32.5 dBm	32.5 dBm
EGSM 900	Channel	975	37	124
	Frequency	880.2 MHz	897.4 MHz	914.8 MHz
	Max power	32.5 dBm	32.5 dBm	32.5 dBm
DCS1800	Channel	512	699	885
	Frequency	1710.2 MHz	1747.6 MHz	1784.8 MHz
	Max power	29.5 dBm	29.5 dBm	29.5 dBm
PCS 1900	Channel	512	661	810
	Frequency	1850.2 MHz	1880 MHz	1909.8 MHz
	Max power	30 dBm	30 dBm	30 dBm

13. EXPLODED VIEW & REPLACEMENT PART LIST

13.1 EXPLODED VIEW



Location	Description
EBR00	PCB Assembly,Main
EBP00	Camera Module
EAX00	PCB,Sidekey
SJMY00	Motor,DC
ABA00	Bracket Assembly
ABM00	Can Assembly,Shield
ABN00	Cap Assembly
ADB00	Dome Assembly,Metal
EBR01	PCB Assembly,Flexible
SUMY00	Microphone,Condenser
SUSY00	Speaker Module
SVLM00	LCD Module
SURY00	Receiver
GMZZ00	Screw,Machine
ACQ00	Cover Assembly,Rear
MBL00	Cap
EAA00	PIFA Antenna,Multiple
ACQ01	Cover Assembly,Front
AEX00	Keypad Assembly,Main
MBG00	Button
MJN00	Tape,Window
MKC00	Window,LCD
ACQ02	Cover Assembly,Battery
EAC00	Rechargeable Battery,Lithium Ion

13. EXPLODED VIEW & REPLACEMENT PART LIST

13.2 Replacement Parts <Mechanic component>

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	Location No.	Description	PartNumber	Spec	Remark
1	AGQ000000	Phone Assembly	AGQ86666501	LGS367.ACISZY SG:SILVER GOLD -	
2	MEZ049600	LABEL, MODEL	MLAK0019618	KG129 CHMRD RD, ZZ, COMPLEX, (empty), , , , ,	
2	ACQ100400	Cover Assembly, EMS	ACQ85769901	LGS367.ACISZY SG:SILVER GOLD -	
3	EBR00	PCB Assembly, Main	EBR74366801	LGS367.ACISZY 1.0 Main	
4	EBR071800	PCB Assembly, Main, SMT	EBR74352701	LGS367.ACISZY 1.0 Main	
5	MEZ000000	Label	MLAZ0038301	COMPLEX LG-VX6000 ZZ:Without Color PID Label 4 Array PRINTING,	
5	EBR071700	PCB Assembly, Main, SMT Top	EBR72964601	LGS365.AINDBK 1.0 MAIN	
6	EAX010000	PCB, Main	EAX64125401	LGS365.AINDBK 1.0 FR-4 SBL 6 0.8T MAIN	
5	EBR071600	PCB Assembly, Main, SMT Bottom	EBR73825801	LGS360.ACHNBK 1.1 Main	
6	EBP00	Camera Module	EBP61321801	LM22HYFFR LM22HYFFR 2M hynix 1/5 HANSUNG ELCOMTEC CO., LTD.	
4	EBR071500	PCB Assembly, Main, Insert	EBR73369101	LGS365.AINDBK 1.2 Main	
5	EAX00	PCB, Sidekey	EAX64114501	LGS365.AINDBK 1.0 POLYI Double - 0.2mm Sidekey	
5	SJMY00	Motor, DC	SJMY0007104	3V 80mA 0A 12KRPM 0RPM 0SEC 0GF.CM 0OHM	
5	ABA00	Bracket Assembly	ABA73930101	LGS365.AINDBK ZZ:Without Color BRACEKT ASSY PCB	
6	MAZ000000	Bracket	MAZ63125401	MOLD PC LGS365.AINDBK ZZ:Without Color Bracket PCB	
6	MCQ000000	Damper	MCQ66596601	COMPLEX LGS365.AINDBK ZZ:Without Color RECEIVER	
6	MCQ000001	Damper	MCQ66596701	COMPLEX LGS365.AINDBK ZZ:Without Color BRACKET SHIELD	

13. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	MCQ015700	Damper, Connector	MCQ66596801	COMPLEX LGS365.AINDBK ZZ:Without Color conn sub	
6	MJN000000	Tape	MJN67758401	COMPLEX LGS365.AINDBK ZZ:Without Color MOTOR	
6	MJN000001	Tape	MJN67758501	COMPLEX LGS365.AINDBK ZZ:Without Color SPEAKER	
5	ABM00	Can Assembly, Shield	ABM73516901	LGS365.AINDBK ZZ:Without Color -	
6	MBK070300	Can, Shield	MBK62935001	PRESS SUS 0.4T LGS365.AINDBK ZZ:Without Color -	
6	MJN000000	Tape	MJN67903901	COMPLEX LGS365.AINDBK ZZ:Without Color -	
6	MEZ000900	Label, After Service	MLAB0001102	COMPLEX C2000 CGRSV WA:White C2000 USASV DIA 4.0 PRINTING,	
5	ABN00	Cap Assembly	ABN73419001	LGS365.AINDBK ZZ:Without Color RECEIVER	
6	MBL000000	Cap	MBL64919001	MOLD URETHANE LGS365.AINDBK ZZ:Without Color Receiver	
6	MCQ000000	Damper	MCQ66596901	COMPLEX LGS365.AINDBK ZZ:Without Color CAP RECEIVER	
5	ADB00	Dome Assembly, Metal	ADB73598601	LGS365.AINDBK ZZ:Without Color -	
5	RAA050100	Resin, PC	BRAH0001301	UF2040 or 3075BHF . . NONE	
5	EBR01	PCB Assembly, Flexible	EBR73795001	LGS365.AINDBK 1.1 Flexible	
6	EBR070400	PCB Assembly, Flexible, SMT	EBR73775401	LGS365.AINDBK 1.0 Flexible	
7	EBR070300	PCB Assembly, Flexible, SMT Top	EBR73798501	LGS365.AINDBK 1.0 Flexible	
8	EAX010700	PCB, Flexible	EAX64050201	LGS365.AINDBK 1.0 POLYI Double 2 0.45T FLEXIBLE	
7	EBR070200	PCB Assembly, Flexible, SMT Bottom	EBR73793301	LGS365.AINDBK 1.0 Flexible	
8	EAG020000	Connector, BtoB	ENBY0053101	14-5804-014-000-829+ 14, mm, STRAIGHT, 0.40MM, MALE, KYOCERA ELCO KOREA SALES CO., LTD.	

13. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
8	EAG120500	Socket, Card	EAG62830801	KCN-ET-0-0103 USIM 12P ANGLE SMD R/TP 18.9x21.4x3.0t, Normal Dual SIM socket KSD CO., LTD	
5	MCQ049800	Damper, Motor	MCQ66597301	COMPLEX LGS365.AINDBK ZZ:Without Color -	
5	MEV000001	Insulator	MEV63830801	COMPLEX LGS365.AINDBK ZZ:Without Color -	
5	MEV000000	Insulator	MEV63896301	COMPLEX LGS365.AINDBK BK:Black -	
5	MJN000001	Tape	MJN67758901	COMPLEX LGS365.AINDBK ZZ:Without Color ZIF CONNECTOR	
5	MJN000000	Tape	MJN67759001	COMPLEX LGS365.AINDBK ZZ:Without Color LCD	
5	SUMY00	Microphone, Condenser	SUMY0003816	OBM-410L44-RC1882 -44DB 2.2KOHM OMNI 1TO10V 4x1.0t FPCB BSE CO., LTD.	
5	SUSY00	Speaker Module	SUSY0024805	16-8T-07PP 16-8T-07PP, PIN, 8 ohm, 91 dB, 16 mm, 3.4T spring 0.9W KIRYN TELECOM CO., LTD	
5	SVLM00	LCD Module	SVLM0039602	DM24-DSM07 Main, 2.4, 240*320, 42.2*60*1.5, 262K, TFT, TM, S6D04H0, LG INNOTEK., LTD.	
5	SURY00	Receiver	SURY0010120	KR120703W1P ASSY, dB, ohm, 1207*2.5T, 10mm, WIRE, KIRYN TELECOM CO., LTD	
3	GMZZ00	Screw, Machine	GMZZ0017701	GMZZ0017701 BH + 1.4mM 3mM MSWR NI PLT N - ASIA BOLT	
3	ACQ00	Cover Assembly, Rear	ACQ85446202	LGS367.ACISZY MK:METALLIC BLACK -	
4	MCK063300	Cover, Rear	MCK66689802	MOLD PC LGS367.ACISZY MK:METALLIC BLACK -	
4	MCQ074200	Damper, Speaker	MCQ66597001	COMPLEX LGS365.AINDBK ZZ:Without Color -	
4	MCQ000000	Damper	MCQ66597101	COMPLEX LGS365.AINDBK ZZ:Without Color MIC REAR	
4	MBL025200	Cap, Earphone Jack	MBL64918502	MOLD PC LGS367.ACISZY MK:METALLIC BLACK -	
4	MBL00	Cap	MBL64918901	MOLD URETHANE LGS365.AINDBK ZZ:Without Color Camera	
4	MCR000000	Decor	MCR64430201	MOLD PC LGS365.AINDBK BK:Black Camera	
4	MEV000000	Insulator	MEV63932301	COMPLEX LGS365.AINDBK ZZ:Without Color Insulator Motor	

13. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
4	MJN020800	Tape, Decor	MJN67758701	COMPLEX LGS365.AINDBK ZZ:Without Color DECO CAMERA	
4	MJN089300	Tape, Window	MJN67758801	COMPLEX LGS365.AINDBK ZZ:Without Color CAMERA	
4	MJN000000	Tape	MJN67779101	COMPLEX LGS365.AINDBK ZZ:Without Color CAP CAMERA	
4	EAA030100	PIFA Antenna, RF	EAA62524802	KI-M01628 SINGLE -2DB 5 Metal Stamping Type - KOMATECH CO., LTD	
4	EAA00	PIFA Antenna, Multiple	EAA62524702	KI-M08629 QUAD -2DB 5 Metal Stamping Type - KOMATECH CO., LTD	
4	MJN061100	Tape, Protect	MJN67903801	COMPLEX LGS365.AINDBK ZZ:Without Color -	
4	MKC009400	Window, Camera	MKC64000701	COMPLEX LGS365.AINDBK ZZ:Without Color -	
3	ACQ01	Cover Assembly, Front	ACQ85721401	LGS367.ACISZY ZY:Color Unfixed -	
4	AEX00	Keypad Assembly, Main	AEX73898401	LGS367.ACISZY ZY:Color Unfixed -	
4	MAZ000000	Bracket	MAZ63125201	PRESS SUS 301 0.4 LGS365.AINDBK ZZ:Without Color LCD	
4	MBG00	Button	MBG64205402	MOLD PC LGS367.ACISZY MK:METALLIC BLACK -	
4	MCK032700	Cover, Front	MCK66689601	MOLD PC LGS365.AINDBK BK:Black -	
5	MET099500	INSERT, NUT	MICE0016903	MECH_COMMON ZY, ZZ, PRESS, STS, , , , ,	
4	MCQ043300	Damper, LCD	MCQ66596501	COMPLEX LGS365.AINDBK ZZ:Without Color -	
4	MCQ000002	Damper	MCQ66718801	COMPLEX LGS365.AINDBK ZZ:Without Color -	
4	MJN061101	Tape, Protect	MJN68070901	COMPLEX LGS367.ACISG ZZ:Without Color -	
4	MCQ000001	Damper	MCQ66745201	COMPLEX LGS365.AINDBK ZZ:Without Color -	
4	MDJ000000	Filter	MDJ63107201	COMPLEX LGS365.AINDBK ZZ:Without Color RECEIVER FELT	
4	MJN00	Tape, Window	MJN67758201	COMPLEX LGS365.AINDBK ZZ:Without Color -	
4	MJN061100	Tape, Protect	MJN67931001	COMPLEX LGS365.AINDBK ZZ:Without Color -	
4	MKC00	Window, LCD	MKC64000602	COMPLEX LGS367.ACISZY ZZ:Without Color -	
4	MCQ000000	Damper	MCQ66745101	COMPLEX LGS365.AINDBK ZZ:Without Color -	

13. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
1	AGF000000	Package Assembly	AGF76208707	LGS367.ACISZY BK:Black LG-S367 CIS (EU1/CIS UB/CIS_LB_China/720ea)	
2	MAY084000	Box, Unit	MAY65153507	BOX Paper 120 90 56 4 COLOR LGS367.ACISZY ZZ:Without Color LG-S367 CIS Unit Box (EU1 CIS Unit Box)	
2	MEZ084100	Label, Unit Box	MLAQ0018301	PRINTING GS200 CISBK ZZ:Without Color Unit Box Label(CIS USE-LGE-Peel-90*40) CIS only_Koorea_Peel_unit box label_90*40	
2	AGJ000000	Pallet Assembly	APLY0003911	GT540.ACISBK ZZ:Without Color EU1 TYPE_CIS_CIS Body(SW)+Cap(EU)+AL_720ea	
3	MAY010800	Box, Carton	MBEC0003604	COMPLEX GX300.ACISWR ZZ:Without Color EU1 CIS Body(720ea/H:605mm)	
3	MCCL00	Cap, Box	MCCL0002501	COMPLEX GD510 CZESV ZZ:Without Color -	
3	MPCY00	Pallet	MPCY0012403	COMPLEX KG800 FRABK DB:DARK BLUE -	
2	MAY047100	Box, Master	MBEE0061001	COMPLEX GD510.ACZESV ZZ:Without Color EU1 Master Box	
2	MBAD00	Bag, Vinyl	MBAD0005204	COMPLEX LG-LX260 SPRAG ZZ:Without Color -	
2	MLAJ00	Label, Master Box	MLAJ0004402	PRINTING CG300 CGR DG ZZ:Without Color LABEL MASTER BOX(for CGR TDR 2VER. mbox_label) GSM standard_master box label	
2	MLAZ00	Label	MLAZ00050901	COMPLEX KU990.AGBRBK ZZ:Without Color Battery Warning Label (Lithium ion Battery Label)	
1	AAD000000	Addition Assembly	AAD85909401	LGS367.ACISZY SG:SILVER GOLD -	
2	ACQ02	Cover Assembly, Battery	ACQ85470002	LGS367.ACISZY ZY:Color Unfixed -	
3	MCK004100	Cover, Battery	MCK66689902	MOLD PC LGS367.ACISZY ZY:Color Unfixed -	
3	MCQ074200	Damper, Speaker	MCQ66752501	COMPLEX LGS365.AINDBK ZZ:Without Color -	

13. EXPLODED VIEW & REPLACEMENT PART LIST

13.2 Replacement Parts <Main component>

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	Location No.	Description	PartNumber	Spec	Remark
6	LD300, LD301	LED, Chip	EDLH0015107	99-218UMC/2229397/TR8 WHITE 2.95~3.25 30mA 1200~1600mcd x, y 110mW - R/TP 2P - EVERLIGHT ELECTRONICS CO., LTD.	
6	C494	Inductor, Multilayer, Chip	ELCH0001404	LL1005-FHL1N5S 1.5NH 0.3NH - 400mA 0.13OHM 15GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP TOKO, INC.	
6	L407	Inductor, Wire Wound, Chip	ELCH0003803	LQW18AN3N9C00D 3.9NH 0.2NH - 850mA - - 0.059OHM 6KHZ 35 NON SHIELD 1.6X0.8X0.8MM - R/TP MURATA MANUFACTURING CO., LTD.	
6	L406	Inductor, Wire Wound, Chip	EAP61906501	LQW18ANR27G00D 270NH 2% - 110mA - - 3.4OHM 960MHZ 30 SHIELD 1.6X0.8X0.8MM NONE R/TP MURATA MANUFACTURING CO., LTD.	
6	C247	Capacitor, Ceramic, Chip	ECCH0000180	GRM1555C1H3R3C 3.3pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C479	Capacitor, Ceramic, Chip	ECCH0000183	GRM1555C1H1R8C 1.8pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C138, C139, C200, C239, C311, C406, C407, C408, C409, C415, C466, C467	Capacitor, Ceramic, Chip	ECCH0000143	MCH155CN102KK 1nF 10% 50V X7R -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	L410, L411, L412	Inductor, Multilayer, Chip	ELCH0004721	1005GC2T2N2SLF 2.2NH 0.3NH - 300mA 0.16OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	

13. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C108, C114, C115, C120, C127, C132, C143, C300, C307, C309, C318, C319, C320, C321, C327, C328, C333, C335, C403, C404	Capacitor, Ceramic, Chip	ECCH0004904	GRM155R60J105K 1uF 10% 6.3V X5R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C100, C101, C102, C103, C106, C116, C117, C123, C124, C126, C128, C129, C130, C131, C133, C134, C135, C205, C209, C210, C227, C251, C254, C304, C323, C330	Capacitor, Ceramic, Chip	ECZH0003103	GRM36X7R104K10PT 100nF 10% 10V X7R - 55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	R106, R231	Resistor, Chip	ERHZ0000204	MCR01MZP5F1003 100KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	C236, C417, C418, C493	Capacitor, Ceramic, Chip	ECZH0000813	C1005C0G1H101JT 100pF 5% 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	

13. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	FL303, FL304, FL305	Filter, EMI/Power	SFEY0010501	ICVE10184E150R101FR ESD/EMI 0HZ 15pF 0H SMD R/TP INNOCHIPS TECHNOLOGY	
6	C249	Capacitor, TA, Conformal	ECTH0002703	TCTAL1A107M8R 0.0001F 20% 10V 50UA - 55TO+125C 0OHM 3.2x1.6x1.1 NONE SMD R/TP ROHM CO., LTD.	
6	R112, R330, R331, R332, R408, R409	Resistor, Chip	ERHZ0000485	MCR01MZP5J472 4.7KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R103, R109, R110, R111, R113, R124, R125, R126, R127, R128, R129, R202, R221, R228, R311, R327, R329	Resistor, Chip	ERHZ0000406	MCR01MZP5J104 100KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	C118, C206, C208, C214, C215, C312, C313, C314, C315, C316	Capacitor, Ceramic, Chip	ECZH0001215	C1005X5R1A105KT000F 1uF 10% 10V X5R - 55TO+85C 1005 R/TP - TDK KOREA COOPERATION	
6	L413	Inductor, Multilayer, Chip	ELCH0004707	1005GC2T1N5SLF 1.5NH 0.3NH - 300mA 0.13OHM 7GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	R116, R117, R207, R214, R235, R242	Resistor, Chip	ERHZ0000443	MCR01MZP5J222 2.2KOHM 5% 1/16W 1005 R/TP - ROHM.	

13. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	ZD200, ZD201, ZD300, ZD301, ZD302, ZD303, ZD304, ZD400	Diode, TVS	EDTY0010101	ESD9B5.0ST5G ESD9B5.0ST5G, SOD-923, 5 V, 300 mW, R/TP, 15pF SCG HONG KONG SAR LTD.	
6	C302, C455, C456, C483	Capacitor, Ceramic, Chip	ECCH0000110	MCH155A100D 10pF 0.5PF 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	R220, R226, R238, R241, R302, R319	Resistor, Chip	ERHY0003301	MCR01MZP5J101 100OHM 5% 1/16W 1005 R/TP - ROHM.	
6	R215, R216, R245	Wire Pad, Short	SAFP0000501	LG-VS760 VRZ	
6	C216, C217, C234, C237, C444, C477	Capacitor, Ceramic, Chip	ECCH0000122	MCH155A470JK 47pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	R210, R303	Resistor, Chip	ERHZ0000405	MCR01MZP5J103 10KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	U102	IC, Load Switch	EUSY0173801	AAT4290IJS AAT4290IJS, SC70JW , 8 PIN, R/TP , 5 Individual Load Switch INSPUR LG DIGITAL MOBILE COMMUNICATIONS	
6	C109, C141, C142, C478	Capacitor, Ceramic, Chip	ECCH0000113	MCH155A180J 18pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	Q200	FET	EQFP0000101	2SJ347 P-CHANNEL MOSFET -20V -7 -0.05A 40OHM 100mW SSM R/TP 3P TOSHIBA	

13. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	R104, R223, R224, R225, R229, R232, R233, R236, R237, R239, R240	Resistor, Chip	ERHZ0000484	MCR01MZP5J471 470OHM 5% 1/16W 1005 R/TP - ROHM.	
6	FB101, FB102, FB200, FB201, FB202, FB203, FB204, FB205, FB206, FB207	Filter, Bead	SFBH0008105	BLM15BD182SN1D 1800 ohm 1.0X0.5X0.5 25% 1.4 ohm 0.1A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	
6	C104, C105, C413, C414	Capacitor, Ceramic, Chip	ECZH0001217	GRM155R60J474K 470nF 10% 6.3V X5R -25TO+70C 1005 BK-DUP - MURATA MANUFACTURING CO., LTD.	
6	C229, C232, C301, C306	Capacitor, Ceramic, Chip	ECCH0000115	MCH155A220JK 22pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C220, C221, C454, C458, C459	Capacitor, Ceramic, Chip	ECCH0000155	MCH153CN103KK 10nF 10% 16V X7R -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C248, C250, C412	Capacitor, Ceramic, Chip	ECCH0000112	MCH155C150J 15pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	U100	IC, Digital Baseband Processor, GSM	EUSY0429401	PMB8815 , 281, EDGE Rx, ARM11 208MHz, NAND booting, 2.0Mp, FMR, IC, Digital Baseband Processor BGA R/TP 281P INFINEON TECHNOLOGIES (ASIA PACIFIC) PTE LTD.	
6	S300	Socket, Card	ENSY0023601	SCHA4B0402 Micro-SD 8P ANGLE SMD R/TP - ALPS ELECTRIC KOREA CO., LTD.	

13. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C211, C212, C213, C219, C222, C322, C329, C453, C457	Capacitor, Ceramic, Chip	ECCH0007804	CL05A225MP5NSNC 2.2uF 20% 10V X5R - 55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO- MECHANICS CO., LTD.	
6	VA200, VA201, VA202, VA207, VA208, VA209, VA210, VA211, VA212, VA300, VA307, VA308, VA309	Varistor	SEVY0003601	ICVL0505101V150FR 5.6V 0% 60F 1.0*0.5*0.55 NONE SMD R/TP INNOCHIPS TECHNOLOGY	
6	R204, R325, R326	Resistor, Chip	ERHZ0000402	MCR01MZP5J100 10OHM 5% 1/16W 1005 R/TP - ROHM.	
6	C112, C113	Capacitor, Ceramic, Chip	ECCH0002002	C1005X7R1A473KT000F 47000pF 10% 10V Y5P - 30TO+85C 1005 R/TP - TDK CORPORATION	
6	R304, R305, R306, R307, R308	Resistor, Chip	ERHY0000275	MCR01MZP5J563 56KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	C111, C125	Capacitor, Ceramic, Chip	ECCH0000151	CL05B472KB5NNNC 4.7nF 10% 25V X7R - 55TO+125C 1005 R/TP - SAMSUNG ELECTRO- MECHANICS CO., LTD.	
6	L409	Inductor, Multilayer, Chip	ELCH0005001	HK1005 2N2S 2.2NH 0.3NH - 300mA 0.13OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO., LTD	
6	C122, C204, C429	Capacitor, Ceramic, Chip	ECCH0007803	CL10A106MP8NNNC 10uF 20% 10V X5R -55TO+85C 1608 R/TP 0.8MM SAMSUNG ELECTRO- MECHANICS CO., LTD.	
6	C257	Capacitor, Ceramic, Chip	ECCH0006201	C1608X5R0J475KT000N 4.7uF 10% 6.3V X5R - 55TO+85C 1608 R/TP - TDK CORPORATION	
6	U200	IC, Mini ABB	EAN61833301	LP8727 1.6V to 5.5V 0SEC 0SEC 0W 8 Mini ABB Basic MUIC, Charger IC WL-CSP R/TP 25P NATIONAL SEMICONDUCTOR ASIA PACIFIC PTE. LTD.	

13. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	FL400	Filter, Saw, Dual	EAM62071301	B9836 GSM QUAD 1.8*1.4*0.4 SMD R/TP 10P EPCOS PTE LTD.	
6	R200, R219	Resistor, Chip	ERHZ0000407	MCR01MZP5J105 1MOHM 5% 1/16W 1005 R/TP - ROHM.	
6	U301	IC, Sub PMIC	EUSY0344403	RT9396GQW QFN, 24, R/TP, 4CH+2LDO, IC, Sub PMICIC, Sub PMIC RICHTEK TECHNOLOGY CORP.	
6	C207, C224, C230	Capacitor, Ceramic, Chip	ECCH0000182	GRM155R61A104K 0.1uF 10% 10V X5R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	L420, L421	Inductor, Multilayer, Chip	ELCH0004722	1005GC2T47NJLF 47NH 5% - 200mA 1.3OHM 1GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	VA213, VA301, VA302, VA303, VA304, VA305, VA306	Varistor	SEVY0005101	ICVL0518050FR 18V 0% 5F 1.0*0.5*0.55 NONE SMD R/TP INNOCHIPS TECHNOLOGY	
6	L414	Inductor, Multilayer, Chip	ELCH0001033	HK1005 1N5S-T 1.5NH 0.3NH - 300mA 0.1OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO., LTD	
6	R404, R405	Resistor, Chip	ERHZ0000531	MCR01MZP5J271 270OHM 5% 1/16W 1005 R/TP - ROHM.	
6	R107	Resistor, Chip	ERHZ0000499	MCR01MZP5J562 5.6KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R425	Resistor, Chip	ERHY0000128	MCR01MZP5F1502 15KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	R213	Resistor, Chip	ERHZ0000529	MCR01MZP5J152 1.5KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	L201, L202, L419	Inductor, Multilayer, Chip	ELCH0001425	LL1005-FHL82NJ 82NH 5% - 150mA 1.9OHM 1.15GHZ 10 SHIELD NONE 1.0X0.5X0.5MM R/TP TOKO, INC.	
6	X100	Crystal	EXXY0027001	DSX321G-26M(8PF) 26MHZ 10PPM 0F NONE SMD R/TP DAISHINKU CORPORATION.	
6	C334, C424	Capacitor, Ceramic, Chip	ECZH0000830	C1005C0G1H330JT000F 33pF 5% 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	

13. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C255, C256, C258, C331, C332, C410	Capacitor, Ceramic, Chip	ECCH0000120	MCH155A390J 39pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C246	Capacitor, Ceramic, Chip	ECCH0007802	CL10A475KP8NNNC 4.7uF 10% 10V X5R - 55TO+85C 1608 R/TP - SAMSUNG ELECTRO- MECHANICS CO., LTD.	
6	FL300, FL301, FL302	Filter, EMI/Power	SFEY0015501	ICVE10184E050R101FR ESD/EMI 550HZ 10F 0H SMD R/TP INNOCHIPS TECHNOLOGY	
6	C336	Capacitor, TA, Conformal	ECTH0001902	F981A106MMA 10 uF, 10V, M, L_ESR, 1608, R/TP NICHICON CORPORATION, EAST JAPAN SALES OFFICE	
6	SW400	Connector, RF	ENWY0007601	NMS-306 NMS-306, SMD, dB SwitchKOREA Co., Ltd	
6	L402, L405	Inductor, Multilayer, Chip	ELCH0005004	HK1005 22NJ 22NH 5% - 300mA 0.6OHM 1.9GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO., LTD	
6	C223, C226	Capacitor, Ceramic, Chip	ECCH0000179	GRM155R71C223K 22nF 10% 16V X7R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C419, L423, L424	Inductor, Multilayer, Chip	ELCH0001031	HK1005 15NJ-T 15NH 5% - 300mA 0.46OHM 2.3GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO., LTD	
6	C119	Capacitor, Ceramic, Chip	ECZH0001210	C1005Y5V1A474ZT000F 470nF -20TO+80% 10V Y5V -30TO+85C 1005 R/TP - TDK KOREA COOPERATION	
6	R328	Resistor, Chip	ERHZ0000433	MCR01MZIP5J184 180KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	C107, C110, C140	Capacitor, Ceramic, Chip	ECZH0001216	C1005X5R1A224KT000E 220nF 10% 10V X5R - 55TO+85C 1005 R/TP - TDK KOREA COOPERATION	
6	CN300	Connector, BtoB	ENBY0053201	24-5804-014-000-829+ 14P 0.40MM STRAIGHT FEMALE SMD R/TP 900mM - KYOCERA ELCO KOREA SALES CO., LTD.	
6	R309, R310	Resistor, Chip	ERHY0000181	RC1005F150CS 150OHM 1% 1/16W 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	Q400, Q401	TR, Bipolar	EBK61573301	2SC5086 NPN 3V 20V 12V 80mA 1UA 80~160 100mW 2-2H1B R/TP 3P TOSHIBA ELECTRONICS KOREA CORPORATION	

13. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	BAT100	Module, Assembly	SMZY0026701	EECEP0F333YD GM750 SFRTN Backup Capacitor, 0.03F, 3.8pi, Module Assembly PANASONIC INDUSTRIAL KOREA CO., LTD	
6	C427, C428	Capacitor, Ceramic, Chip	ECCH0000195	GRM1555C1H3R9C 3.9pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	VA205, VA206	Varistor	SEVY0004301	ICVL0518100Y500FR 18V 0% 10F 1.0*0.5*0.55 NONE SMD R/TP INNOCHIPS TECHNOLOGY	
6	J200	Jack, Phone	EAG62831701	KJA-PH-3-0176 4P 4P ANGLE R/TP 3.5M BLACK 5P 6.5x12.6x4.0t, Short Detect, All DIP type KSD CO., LTD	
6	R105	Resistor, Chip	ERHZ0000475	MCR01MZP5J392 3.9KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	R400, R401	Resistor, Chip	ERHZ0003801	MCR01MZP5J5R1 5.1OHM 5% 1/16W 1005 R/TP - ROHM.	
6	R402, R403	Resistor, Chip	ERHZ0000449	MCR01MZP5J243 24KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	C423, C426	Capacitor, Ceramic, Chip	ECZH0000802	C1005C0G1H010CT 1pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	R102, R234, R407	Resistor, Chip	ERHZ0000404	MCR01MZP5J102 1KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	C228	Capacitor, Ceramic, Chip	ECZH0003503	GRM188R61E105K 1uF 10% 25V X5R -55TO+85C 1608 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C218, C317	Capacitor, Ceramic, Chip	ECCH0005603	GRM188R61A225K 2.2uF 10% 10V X5R -55TO+85C 1608 R/TP - MURATA MANUFACTURING CO., LTD.	
6	U403	IC, Bluetooth	EUSY0418701	BCM2070B2KUBXG 2.3VTO5.5V 158.4mW 42P - WLBGA R/TP 42P BROADCOM ASIA DISTRIBUTION PTE LTD	
6	R211, R212	Resistor, Chip	ERHZ0000435	MCR01MZP5J200 20OHM 5% 1/16W 1005 R/TP - ROHM.	
6	R230	Resistor, Chip	ERHZ0000206	MCR01MZP5F10R0 10OHM 1% 1/16W 1005 R/TP - ROHM.	
6	R406, R410, R412	Resistor, Chip	ERHZ0000408	MCR01MZP5J111 110OHM 5% 1/16W 1005 R/TP - ROHM.	
6	R205, R206	Resistor, Chip	ERHY0000193	RC1005F270CS 27OHM 1% 1/16W 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	

13. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	L425, L426	Inductor, Multilayer, Chip	ELCH0003826	LQG15HS3N3S02D 3.3NH 0.3NH - 300mA - - 0.17OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	C121	Capacitor, Ceramic, Chip	ECZH0025502	GRM219R60J226M 0.000022F 20% 6.3V X5R - 55TO+85C 2012 R/TP 0.85MM MURATA MANUFACTURING CO., LTD.	
6	Q100, Q300	TR, Bipolar	EBK61572201	LSCR523EBFS8 NPN 5V 50V 50V 100mA 100NA 120~560 150mW EMT3 R/TP 3P ROHM Semiconductor KOREA CORPORATION	
6	L200, L408	Inductor, Multilayer, Chip	ELCH0001430	LL1005-FHLR10J 100NH 5% - 150mA 2.2OHM 1.03GHZ 10 SHIELD NONE 1.0X0.5X0.5MM R/TP TOKO, INC.	
6	R217, R426	Resistor, Chip	ERHY0000241	MCR01MZP5J102 1KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	U101	IC, MCP, NAND	EUSY0425901	H8BCS0QG0MMR-46M NAND/1G SDRAM/512M 0VTO0V 8.0x9.0x1.0 TR 130P NAND+DRAM BGA - HYNIX SEMICONDUCTOR INC.	
6	C203	Capacitor, Ceramic, Chip	ECCH0000117	CL05C270JB5NNNC 27pF 5% 50V NP0 -55TO+125C 1005 R/TP 0.5 SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	L417, L418	Inductor, Multilayer, Chip	ELCH0001049	1005GC2T6N8JLF 6.8NH 5% - 250mA 0.32OHM 3GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	U201	IC, Comparator	EUSY0250501	NCS2200SQ2T2G NCS2200SQ2T2G, SC70, 5 PIN, R/TP, Comparator, pin compatible to EUSY0077701 - - SC70 R/TP 5P - ON SEMICONDUCTOR	
6	FL401	Filter, Ceramic	SFCY0000901	LFB212G45SG8A166 BPF 2.45KHZ 100Hz SMD R/TP 4P MURATA MANUFACTURING CO., LTD.	
6	CN302	Connector, FFC/FPC/PIC	EAG62894201	GF032-37S 37P 0.30MM FFC/FPC ANGLE BOTH SMD R/TP LOCKING Back lock type LS Mtron Ltd.	
6	IC200	IC, Audio Sub System	EUSY0403901	WM9093ECS/R 1.71~5.5V 0W WLCSP R/TP 20P - WOLFSON MICROELECTRONICS PLC	
6	FB400	Filter, Bead	SFBH0000903	HB-1M1005-601JT 600 ohm 1.0*0.5*0.5 25% 0.6 ohm 0.3A SMD R/TP 2P 0 CERATECH CORPORATION	
6	U300	IC, Analog Switch	EUSY0317101	SLAS4717EPMTR2G - - - - WQFN R/TP 10P 1.8*1.4*0.75 ON SEMICONDUCTOR	
6	C425	Capacitor, Ceramic, Chip	ECCH0000701	C1005C0G1H1R2CT000F 1.2pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK CORPORATION	

13. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	R222	Resistor, Chip	ERHY0000166	RC1005F394CS 390KOHM 1% 1/16W 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	R101	Resistor, Chip	ERHZ0000506	MCR01MZIP5J682 6.8KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	L100	Inductor, Wire Wound, chip	ELCP0009410	LQM2HPN3R3MG0 LQM2HPN3R3MG0, 3.3 uH, N, 2x2.5x1.0, R/TP, chip power MURATA MANUFACTURING CO., LTD.	
6	R227	Resistor, Chip	ERHZ0000295	MCR01MZIP5F5102 51KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	X101	Crystal	EXXY0018701	FC-135(12.5PF, +-20PPM) 32.768KHZ 20PPM 12.5PF 32*15 SMD R/TP SEIKO EPSON CORP	
6	CN201	Connector, I/O	ENRY0009601	GU074-5P-SD-E1500 5P 0.65MM ANGLE RECEPTACLE DIP R/TP - LS Mtron Ltd.	
6	C201	Capacitor, Ceramic, Chip	ECCH0042301	CL10A225KA5LNNC 0.0000022F 10% 25V X5R - 55TO+85C 1608 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	CN203	Connector, Terminal Block	ENZY0030401	KQ03LV-3R 3, 2.5 mm, STRAIGHT, Gold, Twin One board 5.4mm HIROSE KOREA CO., LTD	
6	FB100, FB103	Filter, Bead	SFBH0007103	BLM15BB750SN1D 75 ohm 1.0X0.5X0.5 25% 0.4 ohm 0.3A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	
6	R130	Resistor, Chip	ERHZ0000222	MCR01MZIP5F1503 150KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	U400	Module, Tx Module	SMRH0007101	SKY77550 33DBM, 33DBM, 31DBM, 31DBM 30DB, 30DB, 28DB, 28DB 39%, 39%, 37%, 37% 50UA 1.46A, 970mA -33DB, -33DB -45DBM -1.3DBM 28P 6.0x6.0x1.0MM - SKYWORKS SOLUTIONS INC.	

13. EXPLODED VIEW & REPLACEMENT PART LIST

13.3 Accessory

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	Location No.	Description	PartNumber	Spec	Remark
2	EBX000000	Accessory, Data Cable	SGDY0018001	LG0029 LG0029 Micro USB, 0.8M ningbo broad telecommunication co., ltd	
2	EAY060000	Adapters	EAY62389801	STA-U35ED2 100-240V 4.8V 400mA 50-60Hz CB, CE WALL 2P USB - DONGDO ELECTRONICS CO., LTD	
2	AFN053800	Manual Assembly, Operation	AFN75496405	LGS367.ACISZY ZZ:Without Color LGS367 manual assy for CIS	
3	MBM087200	Card, Warranty	MCDF0011303	COMPLEX GD350 CISBK ZZ:Without Color -	
3	MFL053800	Manual, Operation	MFL67234905	COMPLEX LGS367.ACISZY ZZ:Without Color LGS367 manual for CIS	
2	EAC00	Rechargeable Battery, Lithium Ion	EAC61699001	LGIP-430N-WWU-TOCAD PRISMATIC 3.7V 900AH 180AH 34x50x4.6 34.15x53x4.7 BLACK inner pack 463450, 900mAh, Innerpack, WW, Up TOCAD DONG-HWA CO., LTD	